Periodical R. R. - 107

FLYING

AUGUST
1947
25¢

for Lightplanes?
PAGE 36

BOYS
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ICE on an airplane's cowl rings is a real threat to tail surfaces and controls. The ice builds up until the heat of the engine finally cracks it. Then, instead of slipping harmlessly off, chunks of ice *climb* in the propeller wash and are hurled at high speeds toward the tail. Sometimes these ice chunks seriously damage the tail and expensive maintenance is necessary.

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THE COVER: Schweizer gliders at Elmira, New York, meet. Photo by Sidney Ross.

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ZIFF-DAVIS PUBLISHING COMPANY
185 North Wabash Ave., Chicago 1, Ill.
Member of the Audit Bureau of Circulations
VOLUME 41 • NUMBER 2

FLYING is published monthly by Ziff-Davis Publishing Company at 185 N. Wabash Ave., Chicago 1, Ill. SUBSCRIPTION RATES: In U. S., Canada, Mexico, South and Central America and U. S. Possessions, $3.00 for twelve issues; in British Empire, $4.00; all other foreign countries, $4.00 for twelve issues. Subscribers should allow two weeks for the change of address. Address all subscription letters to the Director of Circulation, Flying, 185 North Wabash Avenue, Chicago 1. Entered as second class matter, September 8, 1942, at the Post Office, Chicago, Illinois, under the act of March 3, 1879. Entered as second class matter at the Post Office Department, Ottawa, Canada. Contributors should retain copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever adaptations and revisions are necessary to meet requirements. Payment covers all authors', contributors' and contestants' rights, title and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

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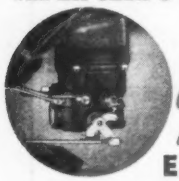

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LETTERS

WANTED: 'SALESMEN'

More than anything else flying needs to be sold to ordinary people—to Mr. John Q. Public. Except for a few expensive promotional schemes, little has been done. And Mr. JQP's aviation experience consists of little more than watching airliners perform from behind a high fence or, worse yet, witnessing thrill performances of reckless acrobatics at so-called "airshows."

Most aviation magazines strive to be of real service to the layman. But usually it's the aviation enthusiast who reads the stuff—people already convinced. It's important to consider how best to sell flying to the outsider. And here's what I believe to be a simple, inexpensive and effective solution for the problem:

Let every fan see to it that the discarded copy of his favorite aviation magazine is left in some public place. Since casual reading is a national habit, the case for aviation should find a lot of new supporters through this device. Barber shops and beauty salons; doctors', lawyers' and dentists' offices, bus and railway stations—these are but a few of the places where the propaganda can be put to work.

And it is an effective device. I have been using it for almost a year now at the barber shop I patronize. Copies of my old magazines are the most thumbworn in the lot. And I get a great deal of satisfaction out of watching the waiting customers study the latest issues and listening to their stimulated conversation. Many unconsciously have developed a keen, well-informed interest in all phases of aviation.

ALVIN J. BRAULT

Scott Field, Ill.

IN APPRECIATION

May we express our appreciation for the story by D. E. Ames entitled "Common-Sense Cockpits" (April issue). The engineers at El Segundo are quite proud of these particular control gimmicks and the piece in FLYING handled the subject well. The arresting hook, landing-gear and flap-control miniatures and the idea behind them were distributed widely by the Navy's Bureau of Aeronautics so that now other aircraft are incorporating them as part of the master program of cockpit simplifications.

CHET MILLER
Div. Industrial
and Public Relations
Douglas Aircraft Company

El Segundo, Calif.

WEATHER MAPS

I believe Prentiss Cleaves has the right approach to the weather-map problem in his article "Something Can Be Done About Weather" (April issue of FLYING).

However, I do believe the plan will run into trouble with the Government. Its simplified method is too direct and too practical to be acceptable to bureaus that are fighting to control and, at times it appears, to throttle private flying.

S. W. BUCKLEY

Wilmington, Del.

. . . "Something Can Be Done About Weather" should be countered immediately. I have been a pilot for many years and a professional meteorologist since 1936. From personal experience I am convinced that the author's opinions are not founded upon sound reasoning.

Despite overall Government economy, the AAF continues weather training of rated personnel. That at least implies the necessity of weather knowledge for safe flying and would seem to blast Cleaves' assumptions.

On one point I agree—"a little knowledge on the subject can be very dangerous." Private pilots need to be expert weathermen to get the most out of their aircraft.

As for the chart proposed by Mr. Cleaves, it is not new. Similar charts were used in AAF weather stations during the war. There is one outstanding reason why they would not be practical—manpower. Even with the unlimited personnel available during the war it was difficult to find men to do a job like that.

My experience as a civilian weather instructor before the war and present instructor of operations and weather briefing at Chanute Field, convinces me that men capable of learning to fly can also learn the fundamentals of weather if given good instruction.

JAMES C. FIDLER

Paxton, Ill.

● FLYING's editors sent a copy of Reader Fidler's letter to Mr. Cleaves who replied:

"I have nothing but awed respect for professional meteorologists. Their profession is one which requires years of technical training and practical experience. Nevertheless, I feel that we are far apart on our fundamental philosophy.

"Mr. Fidler says 'all pilots should be trained in meteorology.' I say that such training is impractical for non-airline pilots, that for their own good they should rely on reports and forecasts by qualified meteorologists; the G-A-R map idea is simply an uncomplicated means of giving them the required information in an understandable way.

"Training requirements for military pi-

(*Continued on page* 88)

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. . . and economically . . . conveniently . . . safely

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A NEW MODERN FLYING SERVICE OFFERED BY YOUR PIPER CUB DEALER

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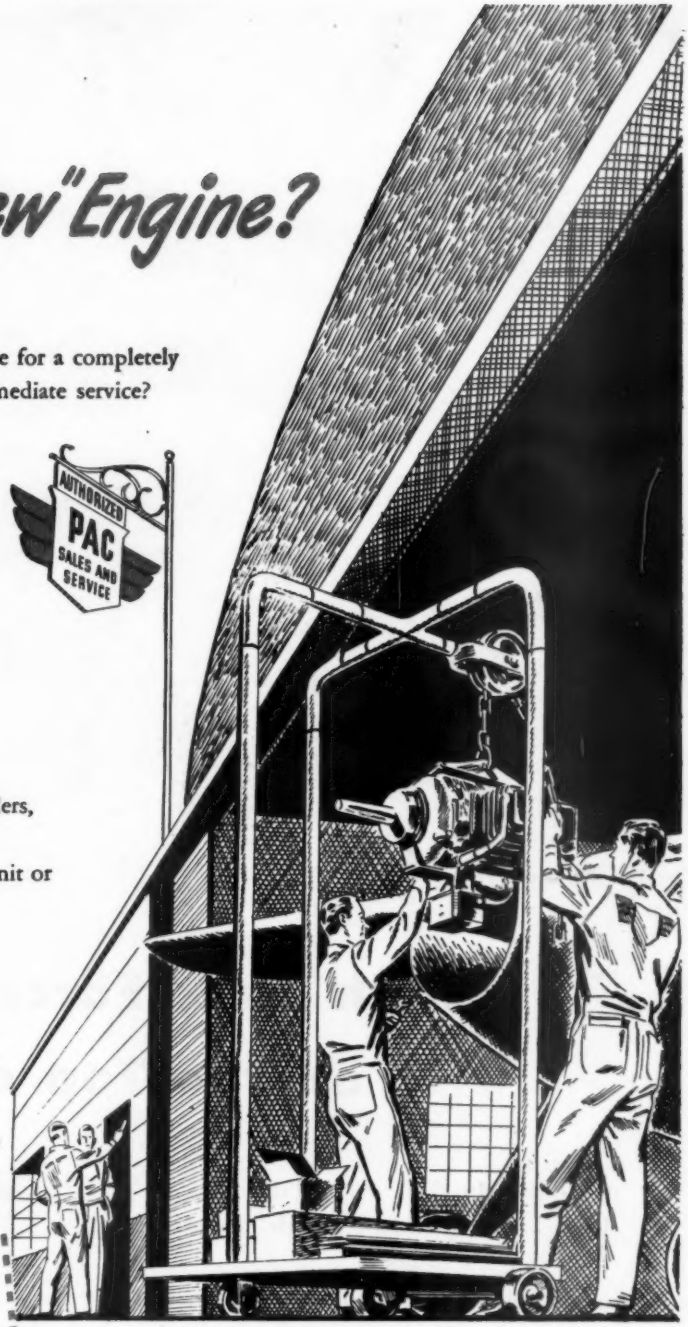
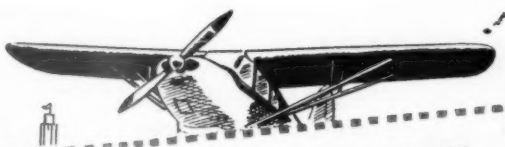
The rebuilt engine you get from PAC, or through one of the members of PAC's national authorized dealer organization, is fully equivalent in quality to the rebuilt engines PAC has regularly supplied to major airlines for years.

When the replacement or repair of engines, propellers, accessories, or instruments becomes necessary, remember that PAC can either furnish an exchange unit or rebuild your own unit. Look for the famous red, blue, and cream PAC sign at your airport.





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It's a flying troop train for Air-transported Infantry and Artillery Battalions.

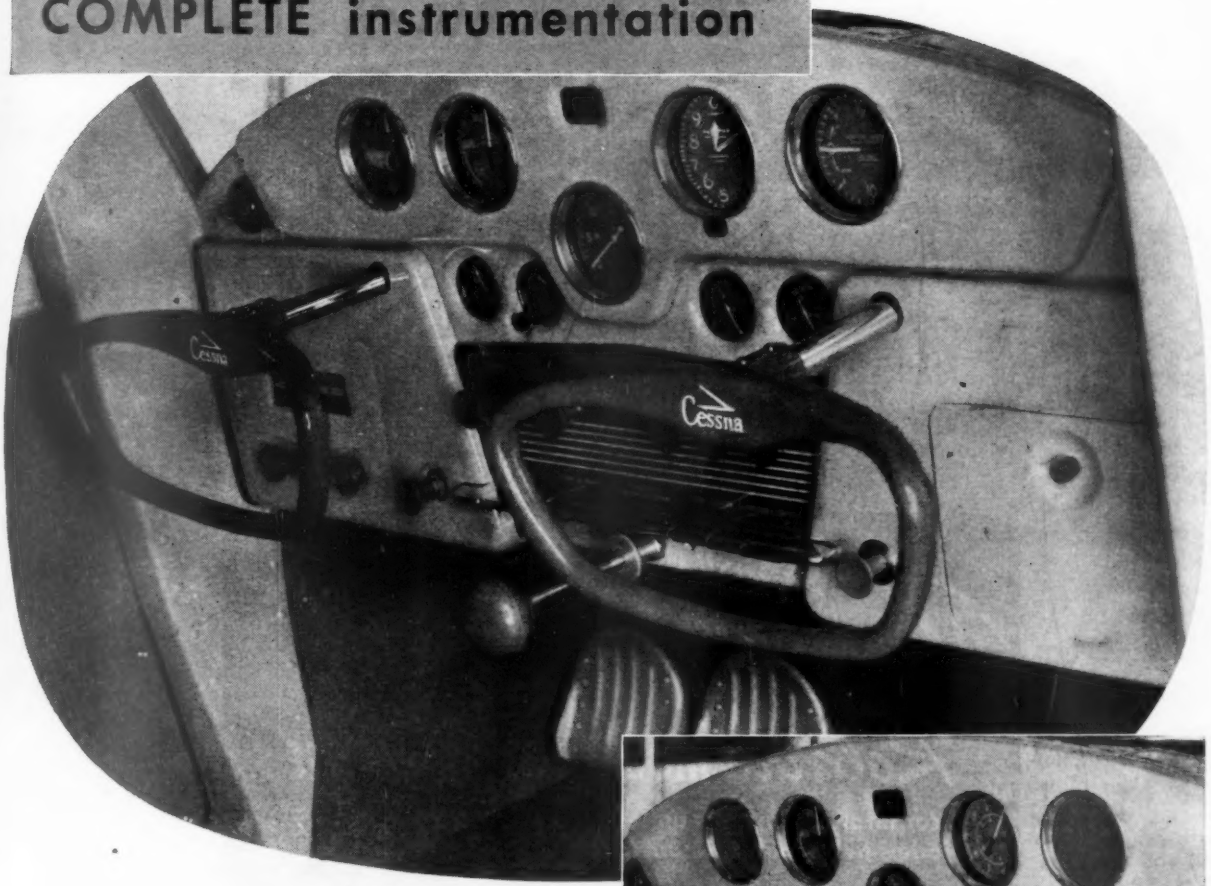
It's transformed in a few minutes into a huge flying ambulance for swiftly transporting as many as 34 litter cases and four attendants.

Designed specifically to carry military cargo, The Packet is another Fairchild example of "the touch of tomorrow in the planes of today."

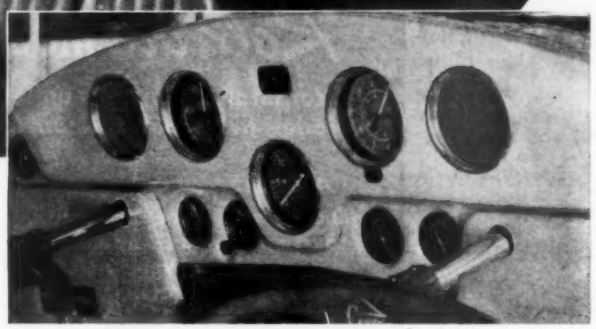
Fairchild Aircraft

Division of Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

Here's a plane that offers COMPLETE instrumentation



Complete instrument group



Standard instrument group

IN SELECTING YOUR NEW PLANE, be sure that it permits *complete* instrumentation. Cessna is such a plane, offering the option of complete basic instrument flight group for its 120 and 140 models. Thousands of Cessna owners have thus secured for themselves the advantages of complete instrumentation, including many flight operators who find the completely equipped 140 model a profit-making instrument trainer.

Provision is made in the standard Cessna panel for these additional instruments and the change is easily made. Replacing the Standard Altimeter of the primary group with a Scout Sensitive Altimeter and adding a Scout Vertical Speed (Climb) Indicator leaves only a Clock and a Turn and Bank Indicator to be added to complete the basic instrument flight group.

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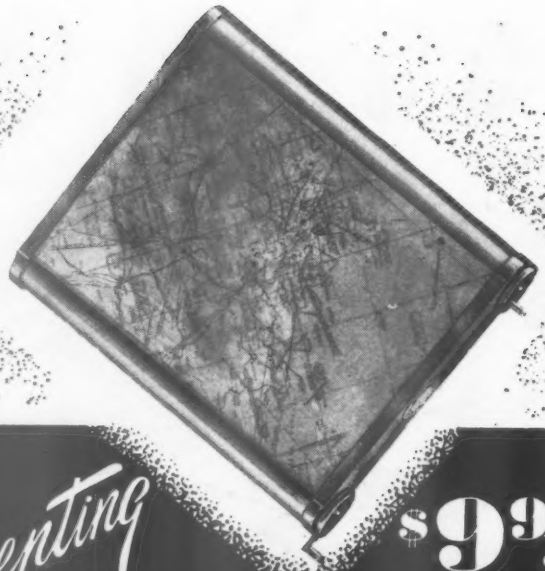

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Says Ralph G. Carpenter, 2nd
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With a floatplane, Director Carpenter finds it easy to visit many lakes, such as this, in one day.

"SURE, the fish fly in New Hampshire, for we use a floatplane to stock fingerlings in even the most remote lakes. And these 'ready-made' airports make it easy for me to cover the entire state on fish and game work. If you fly floats, you'll find it easy, too, to get to the best hunting and fishing grounds."

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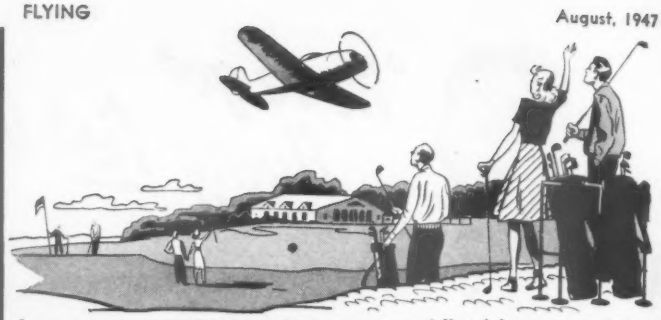

A page of service tips for private flyers and fixed-base operators

How to avoid crankcase foaming

Moisture condensation in your aircraft engine increases crankcase foaming many fold. To avoid this possibility pilots should keep the oil level up to the full mark. In addition to minimizing condensation this practice will help keep oil temperatures lower. One of the many reasons pilots depend on RPM Aviation Oil is because its "defoaming" compound greatly reduces this trouble under all operating conditions.

"Take off" rating important in aviation fuels

The anti-knock characteristics of aviation gasolines are now rated under two operating conditions. In the past these fuels were rated only under cruising conditions, but octane rating during take off has been found to be important. Now, with Chevron Aviation Gasoline exceeding the anti-knock requirements at take off, pilots are assured extra performance when they need it most. Chevron Aviation Gasoline is perfectly balanced to give easy starting, fast take off and dependable protection aloft.

Proper instrument care pays off in safer flying

The proper care of aviation instruments is a simple and inexpensive precaution that pays off in accuracy at crucial moments. A suitable instrument lubricant is required for full protection. The anti-rusting ingredient in RPM Aviation Instrument Oil protects gyro and other instrument bearings from rust due to condensation often found with ordinary oils. That's why it's recommended for all instruments where rusting is a problem.

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New Speed...New Performance...YET COSTS LESS THAN ANY OTHER 85 HP. SIDE-BY-SIDE PLANE!

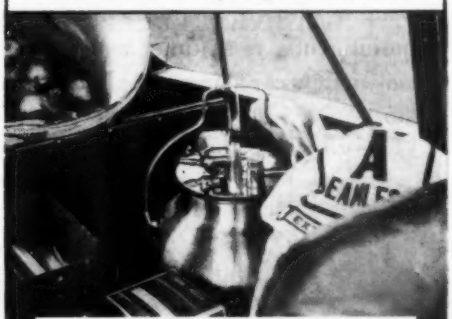
Again—it's AERONCA! Again—with the new Super-Chief—Aeronca shows the way in economical, top-performance, personal flying.

Here's *real* power—*85* Horsepower . . . power you *feel* the moment you get your hands on the wheel! You *go faster—climb faster—maneuver faster!* Here's *real* luxury that means comfortable, relaxed flying all the way! Here is beauty and performance that only Aeronca engineering—the world's finest—could produce.

Here—in short—is the personal plane you've always wanted. See the new Aeronca Super-Chief — fly it — at your nearest Aeronca dealer's *this weekend!* Aeronca Aircraft Corp., Middletown, Ohio.

"BETTER FLY AERONCA!"

Attention—Flying Farmers!



HERE'S YOUR NEW AERONCA FLYING FARM WAGON—Has 24 cubic feet of cargo space. Holds 220 pounds of equipment and baggage. Can be converted in 10 to 15 minutes into a standard 2-passenger Aeronca. Price: $2510.00 F.A.F.

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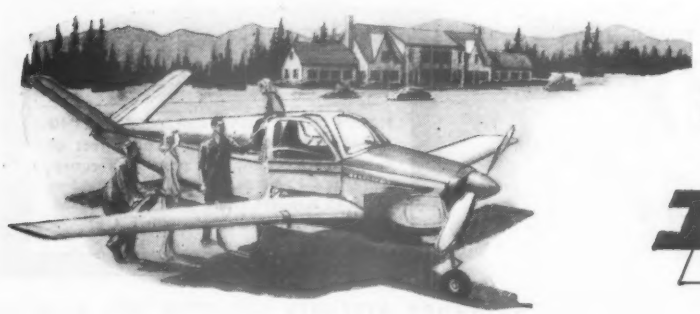
—with the Beechcraft BONANZA

• *Top Speed, 184 mph; Cruising Speed, 172 mph; Range, 750 miles*

BUSINESSMEN in the smaller towns are the most numerous purchasers of the new Beechcraft Bonanza. Why? Because the Bonanza offers them transportation opportunities even better than those enjoyed by businessmen in the large "main line" city.

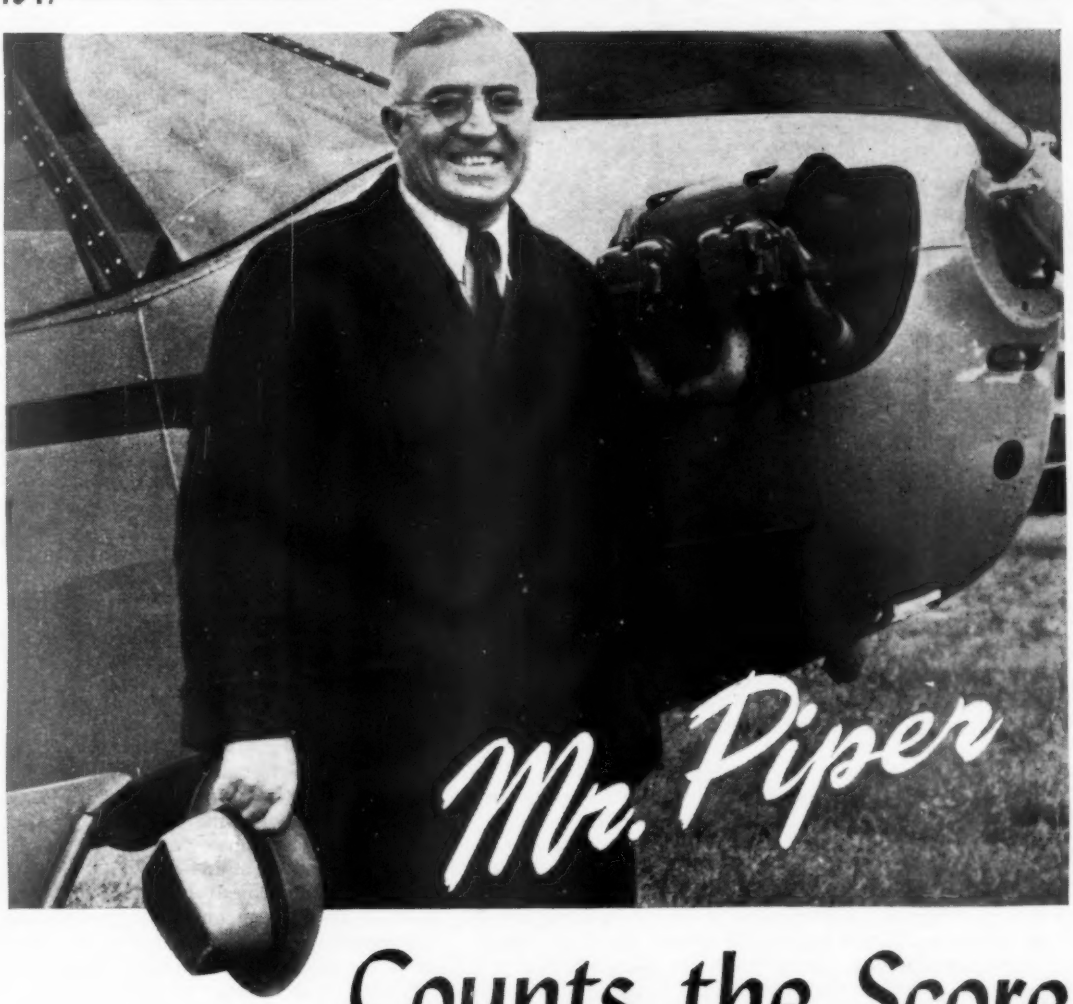
Denied the arterial highway and the main rail and air lines, the Bonanza owner in the small community simply hops over them, goes straight to his destination—any destination—at close to airline speed. He goes in splendid comfort, too. For the four-place Bonanza, with its limousine-like appointments, is as quiet as an open-window car skimming along at 55.

The-go-when-you-want-to-go utility of the Bonanza saves time and it saves money. Operating costs dip as low as *one cent* per passenger mile. It is fully equipped with lights and radio for day or night, all-season flight. Designed for business use, the Bonanza is a new transportation "equalizer" that puts *any* business on the "main line."



Your Beechcraft distributor will be glad to demonstrate the Bonanza for you—and to discuss its adaptability to your transportation requirements. We are still filling a large backlog of orders. Additional ones will be filled in sequence. Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

BEECHCRAFT BONANZA MODEL 35



Counts the Score

The dean of the lightplane industry reflects on the last 20 years of FLYING and the personal plane

FLYING's 20th anniversary is a better time than most to review aviation's past and look at its future.

We have, fortunately, passed the plane-in-every-lunch-box stage of post-war flying and are in a good position to cope with the pessimism that more recently has been sneaking up on the industry. Without undue pessimism or optimism, and assuming that we are willing to profit by the lessons we have been exposed to in the past 20 years, I think the industry is in the best shape in its history. Sales during the next 20 years should make those during the last 20 seem miniature by contrast.

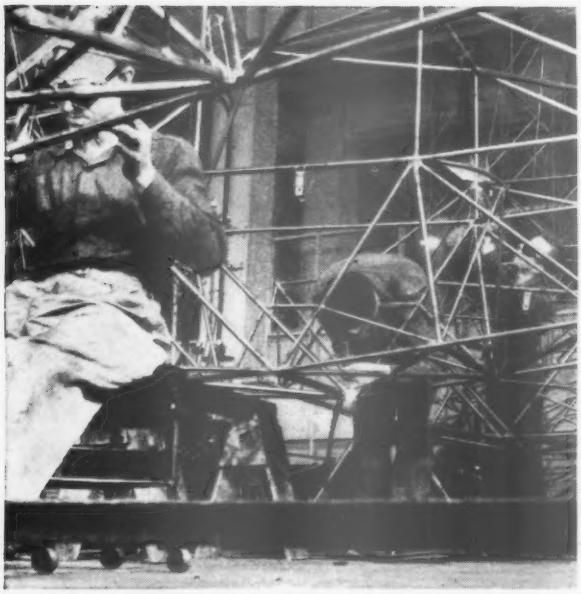
But this will only be possible if we profit by our mistakes and recognize a few fundamentals which we must face before lightplane prosperity can get under way in these air-minded times.

Here are some of the most important facts:

Aviation is not a mass-production industry, either from the manufacturing or the customer viewpoint. It is a craft industry and probably will remain so for at least another 20 years.

Our best potential customers are not the youth of the nation—if they ever were. They are important, but our best potential customers are middle-aged.

We must concentrate on making roomier aircraft with better performance in all categories, and not go overboard on our dreams of airplanes of the future. I would be the last to say that the day will never come when all aviation's dreams will be realized. But in the meantime we must recognize that, for the present, half-flying-half-auto contraptions, machines that can fly at good cruising speeds but will land on a dime, and



Highly-technical hand operations go into the simplest personal airplane, a fact that keeps such aircraft from being mass-produced.

planes with removable wings or jet power, are still in a highly experimental category.

We must have many more airports.

We must quit over-selling ourselves and our public.

We must improve service all along the line.

Looking at these statements pessimistically at first, let's see what the past 20 years should have taught us.

Take the mass-production problem—and let's not begin by confusing it with the assembly-line problem. We've learned a lot about assembly lines in the past 20 years, some from the automobile industry, most of it the hard way. Even a factory with annual unit production in the three-figure bracket has some semblance of an assembly line and as production increases the line improves. This isn't mass production, it's just horse sense.

But look more closely at anybody's airplane assembly line and you will find that every man working on it is a craftsman. He does a lot of highly technical things with his hands when the fuselage or engine stops in front of him. He and the other workers add up to the many man-hours that go into total labor making an airplane today.

Those man-hours could be reduced amazingly if special machines were designed to do the things men now do with their hands. But the machines will not pay off in aviation unless they can be kept day after day, week after week, doing their stuff on thousands and thousands of planes—mass-production for a mass-market.

We estimate that the point at which mass-production could be begun profitably at Piper would be an annual production of at least 50,000 planes. We do not anticipate such a demand for as far into the future as we can see.

Let's face it—there isn't a mass-market. There can't be now or in the forseeable future. If the past 20 years have taught us anything, they should have taught us that only a relatively few people can take advantage of the utility or pleasure of the airplane. They add up to a lot of people but not to the millions sometimes envisioned.

We come down to this plain fact—aviation is a craft industry, craftsmen cost money, production will be small compared with mass-market production and prices will remain correspondingly high.

We must concentrate on making roomier aircraft with better performance and not go overboard on our dreams of airplanes of the future.

Again, the plain facts of the past 20 years illustrate the lesson. We know—or we should know—that roadable airplanes, for instance, while feasible, are complicated because they violate one of the fundamentals of aerodynamics and therefore raise costs, operation expenses, and upkeep. A roadable that will not fall apart at the first traffic light must withstand stresses and strains different from those encountered aloft. Construction has to be auto-sturdy and to do that means adding weight. A *heavy* lightplane is an anachronism. Anybody who knows anything about them, especially if he is a potential customer, knows this. Anybody who doesn't will soon find it out and be angry at anyone who misleads him into buying a half-plane. It is bad business any way you figure it, and the sooner we quit compromising and concentrate on building the best possible *airplane*, the better off we'll be.

This applies with equal force to helicopters (even their best friends admit that they are still in a highly experimental and highly expensive stage), and lightplanes powered with jet engines.

Their future is unlimited; their present has a dubious and very limited public appeal.

Today, the lightplane imperative is to build what we best know how to build—airplanes.

If the assumption is true that we are going to concentrate on making and selling airplanes, it is obvious that we are going to have runways to land them on. Airports are an urgent lightplane "must" in aviation today.

Saying it isn't going to get them built. Equally urgent is that we who are interested in the welfare of the lightplane, pilot and manufacturer alike, have to educate the public in the need for ports and their economic benefits to the community.

A steady, consistent, nation-wide campaign is needed to point out that airports are a community asset, that they are comparatively inexpensive, that they are not a nuisance, and that they are a national necessity both for prosperity and for defense.

We cannot point out too often that airports are cheaper than highways. A plane with the necessary range can make a 400-mile trip using only $100,000 worth of airports. An automobile making the same trip will use some $20,000,000 in highways. Airports, too, increase in usefulness as they increase in number. Build two and you have only two places to go. (*Continued on page 75*)

FLYING
IS 20 YEARS OLD THIS MONTH

This magazine was founded in 1927, shortly after Lindbergh made his famed flight to Paris. FLYING *has grown with the aviation industry to the point where, today, it is the largest publication of its kind in the world. In the above article, Mr. Piper has sounded the keynote for today. For other comments by U. S. aviation leaders,* *turn to page 32.*

HOW TO GIVE THAT *First Ride*

Smooth, level flight is essential for introducing first-rider to private flying. Airlines have strict limits on air maneuvers.

Pilots must use special care when introducing non-flyers to airplanes.

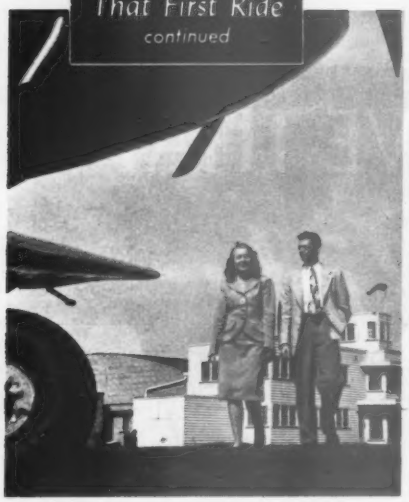
PHOTOGRAPHS BY ARTHUR E. HAUG

FEAR is aviation's worst enemy. And the hotshot, showoff pilot runs a close second. While there are no statistics to prove it, there is no doubt of the fact that the smart-aleck, inconsiderate pilot has scared away as many potential flyers as any other single factor. There's nothing like a zooming take-off, tight vertical turns or steep dives to make the already-apprehensive first-rider vow never to sit in one of the "darned things" again. And the occasional block-headed pilot who introduces the girl friend to flying with a string of aerobatics should be run off the field with a horsewhip.

To show how that first plane ride should be given, FLYING asked Airline Pilot Harold Bothwell (who sells Navions in his spare time) to take Lynn Slife, secretary to FLYING's editor, for a flight. She was tense and worried, but soon was enjoying the flight thoroughly

Pilot Bothwell tells first-rider Slife how the Navion's controllable prop works.

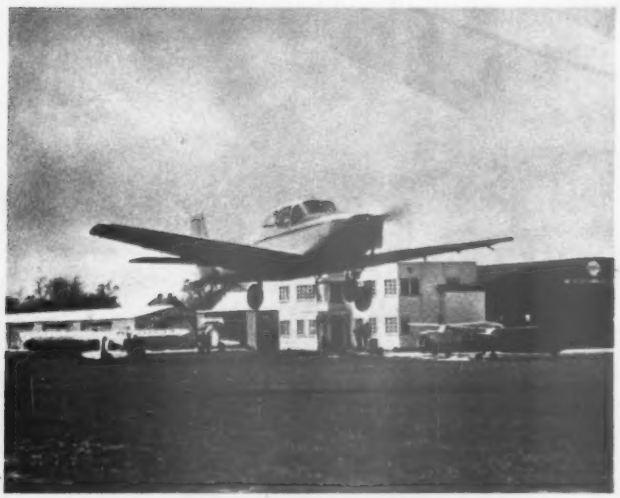
(CONTINUED ON FOLLOWING PAGE)



1 **Walking to plane,** Bothwell explains its features to Miss Slife. First-riders usually are full of false ideas about flying.

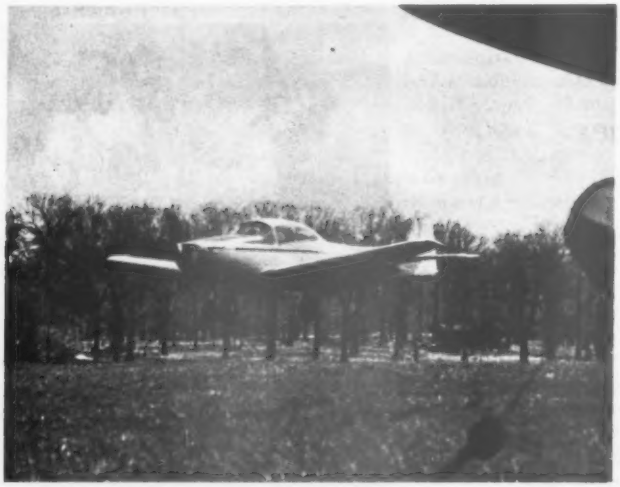
2 **How plane flies** is explained with help of the Navion's tail surfaces. Later, in the cabin, Bothwell lets her move controls.

3 **Inside cabin,** he explains instruments, pointing out that this panel is more complex than in most small planes.



6 **Smooth take-off** is important. Bothwell lets Navion fly itself off, then handles controls gently. The climb away from the field also is gradual and gentle. Smoothness begins to relax Miss Slife.

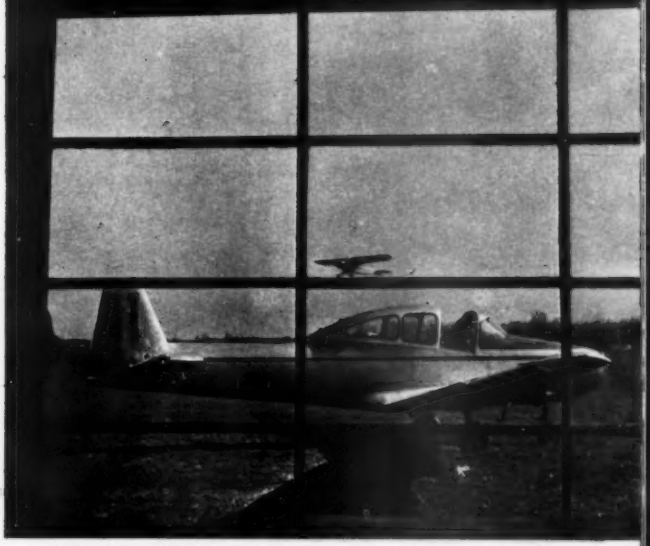
7 **Level flying** is done as much as possible. Turbulent air at lower altitudes causes Bothwell to climb to smoother level. No climbs should be made at over 500 f.p.m.; 300 is better.



10 **Smooth landing** is essential. Gentle return to earth makes Miss Slife realize that there need be nothing terrifying about flying. Bothwell's glide is shallow, for flaps give impression of diving.

11 **Taxiing to line,** Bothwell lets Miss Slife steer Navion with rudder pedals while he operates throttle and brakes. Even now, after an hour's flying, he maneuvers carefully to park plane.

4 **Starting engine,** Bothwell explains how it's done, let s rider become accustomed to the noise. Before running-up engine at take-off point, he tells her what he's doing, and why. She helps him use plane's check list.



5 **She taxies plane** to take-off point, under his guidance. Bothwell now explains the airport's traffic pattern and why it's set up that way. He makes sure she understands each operation in cabin.

8 **Gentle turns** are absolutely mandatory. Best rule of thumb is the airlines' limit of 30°. Miss Slife learns to lean with the turn, not against it. Bothwell puts her at ease by showing her points of interest on ground.

9 **Returning to field** (Wooddale airport, near Chicago), he lowers plane's gear and circles to show her traffic pattern. By this time she has handled controls in the air, has tried gentle turns.

12 **"It was wonderful,"** she tells him as she climbs out. Her reaction is that of all properly-flown first-riders: she can't wait to fly again. It now is clear to her that frightening flying is pilot's fault, not the plane's.

DON'T make steep take-offs just to thrill 'em. Climb gently.

DON'T make steep turns (maximum 30°); avoid any "hotstuff."

DON'T forget. It scares your passenger; is against the law.

The Helicopter Goes To Work

HAT 'copters on display at Third Annual Forum of the American Helicopter Society (top). Below, HAT Sikorsky helicopter lands in mid-town Manhattan parking area.

Publicity is big business with HAT. Last fall a helicopter flew into Griffith Stadium, Washington, D. C., to promote a pro football game.

Helicopter Air Transport Company pioneers a new field in aviation.

By CLIVE HOWARD

THE country's first and still largest fixed-base helicopter operator, ending its first year of business, occupies what is probably the most paradoxical position in modern aviation. The Helicopter Air Transport Company, from its base at Central Airport in Camden, N. J., is daily pioneering new and practical uses for the helicopter. In that respect it occupies the same position as the operator of a conventional airline 25 years ago.

At the same time HAT officials occasionally find themselves confronting popular fallacies which make them wonder if the helicopter isn't 25 years ahead of its time. A lot of people believe the helicopter is here to replace everything that flies, including the birds.

The big question: "Can helicopters operate commercially at present cost of manufacture and operation?" is best answered by the quick growth of Helicopter Air Transport. The line is now utilizing at full capacity nine 'copters: four four-place Sikorskys and five two-place Bells. More craft are on order and no slide rule is needed to prove that HAT is going to be busy a long time. (*Continued on page* 64)

Santa Claus came to Hess Brothers (Allentown, Pa.) in that most modern conveyance—a HAT helicopter.

Platt Le Page helicopter (former AAF XR-1) was rebuilt by HAT for crop dusting and utility work.

Flying Newsboys

Bundle of papers is dropped by Pilot Cecil King. Waiting newsboy, Roderick Foster, will have them delivered almost as soon as Winfield newsboys. Normal plane load is 126 pounds.

Airman and newsman, Warren Jones (left) and W. W. Keith, plot first Kansas aerial news route.

By MAX BURK

An enterprising Kansas publisher is making lightplanes work for him.

THE whole thing started when floodwaters inundated all highways leading into Winfield, Kan. That situation, coupled with the fact that W. W. Keith (then circulation manager of the *Winfield Daily Courier*) was a pilot, led to the establishment of one of the nation's first aerial newspaper routes. Because of his interest in aviation, Keith's natural reaction was to call on his friend Warren Jones of the Winfield Air Service for help. Jones rolled out a *Cub*, threw bundles of the *Courier* into the rear seat and dropped them to carriers in nearby towns. That was 18 months ago, but the *Courier* still uses flying newsboys.

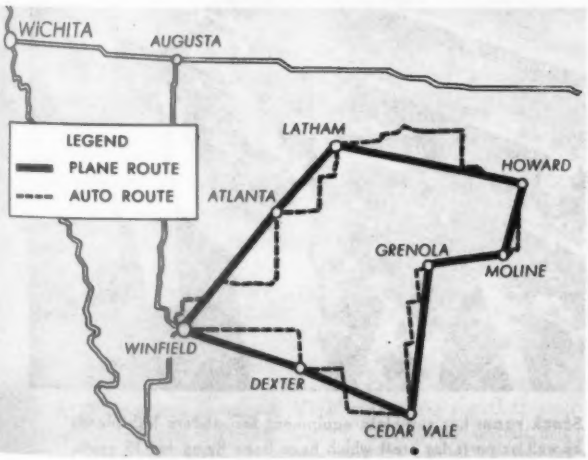
Aerial news service has proved beneficial to practically everyone concerned. Subscribers in nearby towns, for instance, get their papers almost as soon as do residents of Winfield. Formerly it took up to 12 hours for mail delivery, and up to 5½ hours for delivery to towns touched by the *Courier's* automobile service.

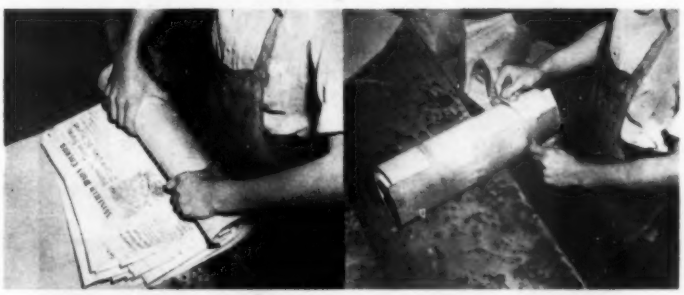
This speed-up in delivery has meant a substantial increase in subscription lists. Correspondingly, Winfield advertisers found customers coming from "new" territory and that puts higher value on *Courier* space.

Paid by the newspaper at a flat weekly rate, Jones and his partner-operator of the Winfield Air Service find an even greater return from the advertising their news route affords. They have added three new instructors to fly 104 students from four nearby fields. In 18 months they've missed only 16 news deliveries because of fog or icing conditions. And since the 107-mile, one-pilot air route is cheaper than the former 200-mile, two-driver highway trip, every delivery has saved the *Courier* money.

Average paper load of the *Cub* on take-off is nine bundles (800 news sheets each) weighing a total of 126 pounds. The load services more than 400 subscribers. Newsboys on bicycles pick up the bundles from the most convenient pasture or cleared area near their home towns. No difficulty is encountered in tossing bundles from the plane, since relative speed of the plane and the falling bundle is zero and the bundle clears the plane easily. END

Papers are loaded in back seat by Pilot King and Betty Smith, airport secretary. King tosses bundles out open window in flight.





Special bundles are made for plane delivery. Maximum of 800 pages are rolled in cardboard and tied with heavy twine. Bundles rarely break.

Route of the flying news service (left) is 100 miles shorter than auto trip, cuts delivery time four hours. One plane does work that once required two autos.

Traffic jeep meets all visiting airplanes and directs them to parking areas at Teterboro Air Terminal. This is but one example of Robinson's efficient operation which has enabled the company to establish flat rate charges on aircraft repair and maintenance.

Flat rates in the making. Service Manager Hilton (center) figures repair costs for Nathan Hummer (left) a BT-13 owner.

Stock room has complete equipment for modern lightplanes as well as parts for craft which have been flying for 15 years.

The Square-Deal House

By JOHN H. LANCASTER
New York Editor of FLYING

PHOTOS BY
WALTER STEINHARD

FOR years the most uncertain feeling a lightplane owner experienced was when his craft was rolled into a hangar by the boys in white coveralls. They might just as well have worn black masks, he felt, because the old labor-plus-materials charges would keep him in hock for the next half year.

Now one fixed base operator, Robinson Aviation, at Teterboro Air Terminal, N. J., has attempted to solve the age-old ailment of the "bite." It has initiated a system of flat rates for every overhaul and repair job required by light aircraft.

With nearly every facility for overhauling and repairing engines, instruments, radios, fuselages and wings under one roof, Robinson is well equipped to attempt this straightforward method of operation. In Robinson's hands, the pilot-owner knows that when his 85-h.p. Continental engine needs an overhaul, he is going to get a complete and professional job at the fixed price of $150—no more, no less. He won't get the old business of "we'll put in new spark plugs" and return to find he also has to pay for a new generator.

He can get, for example, a complete 25-hour or 50-hour check on his engine for $12 and $20 respectively—including oil changes.

These prices are not the lowest in the industry. But they are probably fair, based on what rates are prevailing in the New York-New Jersey area. It took Robinson's Edward L. Franz, general manager of the flight service division, and Gary B. Hilton, service manager, nine months last year to work out the rates.

They had to get costs levelled off and averaged, make time studies, and run through each particular job at least five times before they could figure their costs. Their normal fee for overhaul by licensed mechanics runs $3.50 per hour which compares favorably with the $3 hourly rate automobile mechanics get around Teterboro.

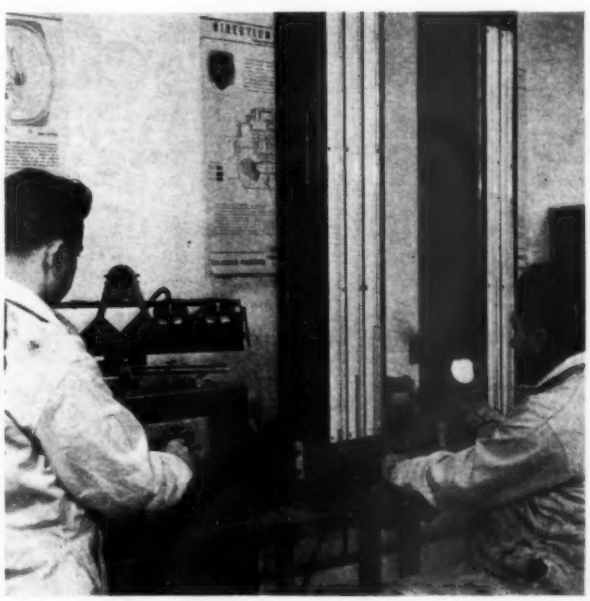
Robinson Aviation has 26 men in flight service, including linemen, aircraft and engine mechanics, instrument and radio technicians, and stock room clerks. Where the company is not equipped to do some highly specialized job, it maintains working agreements with qualified companies.

The engine room can handle every engine up to and including the Pratt & Whitney Wasp, Jr., as well as accessories. Nearly every accessory is included in the flat overhaul rate except pressure carburetors and propeller governors. With $25,000 worth of test equipment, Robinson has everything required of an approved station, including specialized tools for engines 10 to 12 years old. It does magnafluxing. It has vari-drives for generators, flowmeters, and bomb test units for spark plugs, among its special tools.

In the aircraft structures division it repairs metal, fabric, tube and fabric, and wood construction. Three men with a total of over 50 years experience are on hand to sew, dope, rivet, or glue, as the case may be.

The radio mechanics can repair any make of radio, ADF, marker beacons, VHF radio, standard transmitters and receivers, and old models with their wiring diagrams missing. In the navigation and (*Continued on page* 89)

Radio repair demands "know-how." Charley Beck is Robinson's master radio mechanic, with over 15 years of experience.



Precision equipment helps mechanics test instruments carefully. Ball-bank indicator and airspeed are under test here.

Northern pike held up by this angler is one of the lesser game fish in the 5,000-lake area embraced by the Minnesota Arrowhead.

Vast area covered by the Arrowhead is indicated by this aerial view. Rainy Lake alone, on the Canadian border, has 1,600 miles of shoreline.

A FLYING Holiday

Minnesota Arrowhead

Seaplanes and amphibians come into their own in Arrowhead wilderness. Airports and landing strips are scarce in these 20,000 square miles, and great areas do not have roads.

Huge forests and untouched wilderness call pilots to the Minnesota Arrowhead.

THOUGH it is distant in miles from the big population centers of the country, the airplane has brought the Minnesota Arrowhead close to them in time. Aviation truly opens up the 5,000 lakes and hundreds of streams of this inland empire—a huge wild vacationland two-thirds as big as Maine.

Everything in the Arrowhead is on a gigantic scale. It contains the nation's largest national forest, some of its largest lakes, including Lake Superior. It has the biggest mines—and some of the biggest wilderness areas. There are no roads over vast regions and the only trails are portages between the lakes. Even the legendary home of Paul Bunyan is here.

This is the geographical heart of North America. No less than the Rockies, the continental divide lies in Minnesota's Arrowhead. Within its borders rivers start for Hudson's Bay, the Atlantic Ocean and for the Gulf of Mexico—the Mississippi itself is born in Lake Itasca in the Arrowhead. Canada borders the country on the north, Lake Superior on the east, and an indefinite line defines the beginnings of better farmland and cultivation on the west and south. The general outline of this sportsman's paradise, wedged in between the Canadian border and Lake Superior, is like the head of an arrow—whence its name.

Minneapolis-St. Paul is about 150 miles by air from Duluth, southeastern anchor of this 20,000-square mile recreational region. In a 100-m.p.h. lightplane, Chicago is 4½ hours away and New (*Continued on page* 56)

For plane owners tired of flying around airports, here is another in a series of features designed to help pilots plan aerial vacations. We'd like to hear about your FLYING *Holiday.*—Ed.

Archers have special deer seasons and license fees.

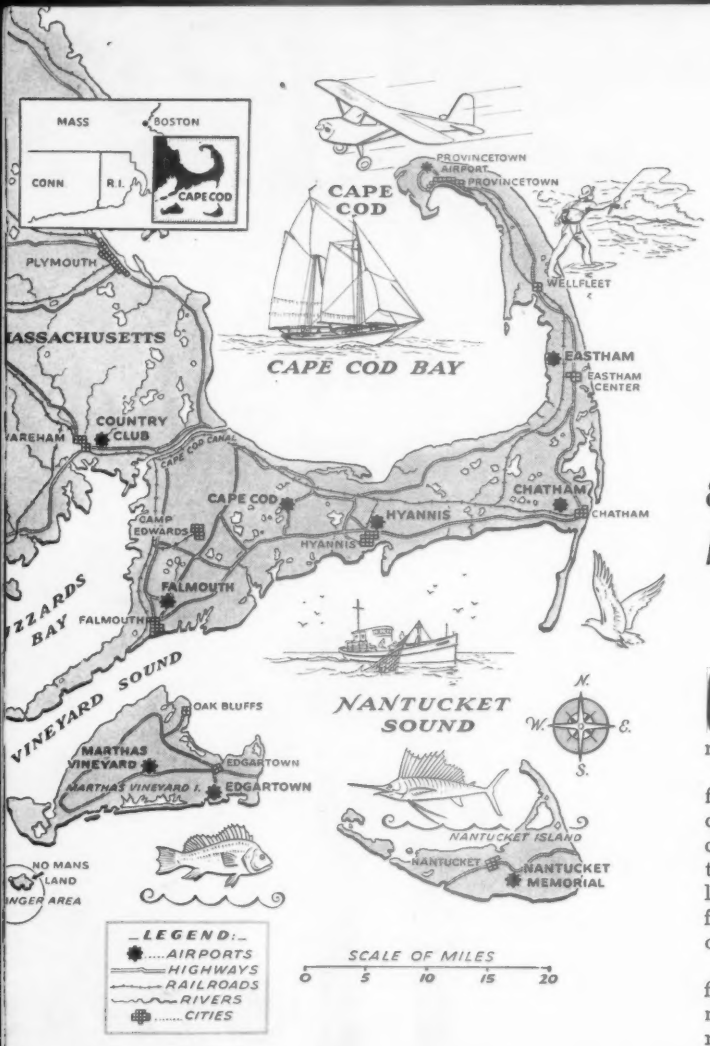
ANOTHER FLYING HOLIDAY ON NEXT PAGE

A FLYING Holiday

Cape Cod

Ever eat yourself sick at a real clam bake? Well, warm up your plane . . .

By ROBERT J. WHITTIER

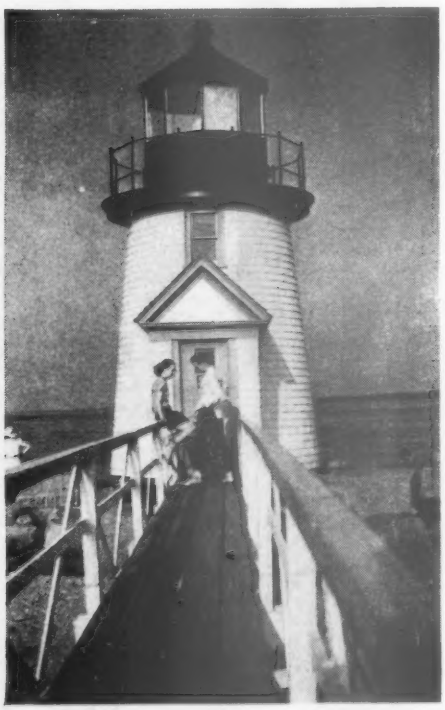


CAPE COD is within a day's flight of the great cities of New England and the North Central States. It retains much of the peace and quaintness of earlier days, yet nearly a dozen airports serve today's flying vacationist.

The Cape is a unique destination for pilots who want to find a wide range of sports and entertainment. It has some of Massachusetts' finest scenery. Green forest forms a carpet over which is spread a pattern of immaculate small towns and villages, of fine golf courses, estates, rivers, and lakes. Around it runs a border of white sand setting it off from the blue ocean. There are no dingy cities, no monotonous plains.

But there is plenty to do. There is fresh and salt water fishing, boating, and swimming everywhere. Over 300 miles of coastline and 167 lakes assure that. You can rough it in a tent in the forest or on the beach, or live in a luxury hotel. There are summer playhouses and theaters, dance halls, parks, golf courses, several museums, and innumerable points of historic interest. Gunning for waterfowl and deer are fall attractions.

In Dennis there is the Summer Playhouse in which are given first-class theatrical performances by famous actors from Hollywood and Broadway. Provincetown is noted for its art colony and during the summer months artists can be seen at work everywhere, (*Continued on page* 70)

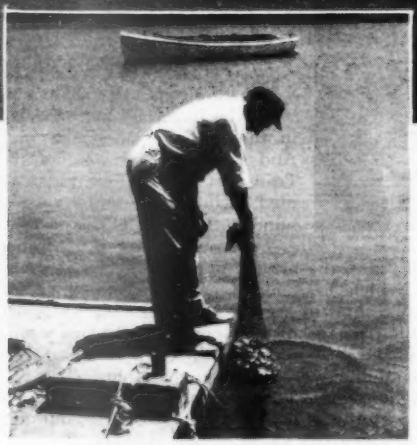


Nantucket lighthouse is a sightseers' favorite. Flying holidayers rent bicycles in town.

Beach parties are favorites at Cape Cod. Using caution, lightplanes can land on the sand. Vacationers here can have as strenuous or as lazy a stay as they want, with lots of variety.

Surf-fishing abounds. This girl has a whopping striped bass hooked on the line.

Art-lovers will find plenty to do throughout the area. This group of art students is working on an old Provincetown, Mass., fishing pier.



Clams are plentiful. This sack-full is being hung in water to keep them alive.

Outdoor eating at Cape Cod is wonderful, especially when the bass you eat were swimming in the ocean a few moments before lunch.

CLARENCE CHAMBERLIN

Famed airman, now retired

Three- and five-place personal planes will be the rule. The smaller plane should cruise between 150 and 200 m.p.h.; the larger from 200 to 250. Landing speed must be about 45. They all will have to have better visibility, more comfort and be free of noise. Personally, I favor the low-wing airplane for the private owner. Airline terminals and private-owner airports are going to have to be separated and kept that way; the two don't mix. Every community of 500 or more will have at least a landing strip. Service and maintenance facilities will be very much like our present super-service stations for autos. The commercial airplane, meanwhile, will haul nearly all urgent cargo, perishables, and first-class passengers. All military forces will be airborne, and military aircraft will fly anywhere, any time.

RALPH S. DAMON

President, American Airlines

Private airplanes and short-range transports will be very much like the conventional types of today in 1967. But we should keep a sharp eye on the rotating-wing type of aircraft, particularly in the field of private flying. But the average private plane then will make today's *Seabees, Bonanzas* and *Cubs* look obsolete and cumbersome. All our long-range airplanes, however, will be high-altitude, pressurized, jet-driven and supersonic by that time. Airplane development today is going at the fastest rate in history. Twenty years ago the outstanding airplanes were the Waco 9, Fokkers and Boeing 40-B's. The tri-motored Ford was just arriving, there were no controllable propellers or two-way radio, few airplanes had brakes. Twenty years from now DC-6's and jet fighters will be just as unusual.

Maj. Gen. OLIVER P. ECHOLS (Ret.)

President, Aircraft Industries Association

Progress in civil and military aviation in the next 20 years should be even more striking than it has been in the past two decades. But to assure that goal, Congress must establish a *new* national air policy which integrates the three elements of air power: air forces, air commerce and air industry. Our present air policies were enacted more than 20 years ago, around FLYING's birthday. Once a new policy is enacted, however, it will be easy to provide for rapid expansion in aircraft production in emergencies, a sound research and development program, and the sheer survival of the industry. Because of our ingenuity and "know-how" we have been far ahead of the rest of the world in aviation. And I am sure that, once they realize their leadership is in jeopardy, Americans will act promptly

20 YEARS

1927

AVIATION in 1927, like atomic energy in 1947, was the stuff of which dreams were made. The Lindbergh Fever had just begun to sweep the country. Ford Air Tours barged about. Energetic Detroiters brightened Rotary and Kiwanis luncheons with wild-sounding conjecture about airports with 3,500-foot runways. Meanwhile, cross-country flyers who failed to arrive before dark looked for the leaping flame of the barrel of gas set afire to guide them in to cow-pasture landings. Waco, Travel Air and Swallow led the personal-plane manufacturing parade, but many a backyard plane builder believed he had a design which would make him the Henry Ford of aviation.

Eddie Stinson was buying Chevrolet brakes for his planes. Ed Schlee and Billy Brock (mad as hornets because the Navy wouldn't put gas on Guam for them so they could fly around the world) were planning an airline from Chicago to Winnipeg. Somebody started the stunt of flying for two to three weeks at a time. Casey Jones was cutting two feet each year off the wings of his Curtiss *Oriole*. Sir Hubert Wilkins was promoting; air-mail volume was growing steadily; the Aeronautics Branch, awkward offspring of the Department of Commerce, was just one year old. But despite all the promotion and propaganda, the aviation industry

Vice Adm. EMORY S. LAND (Ret.)

President, Air Transport Association

The hundreds of thousands of persons who have become private flyers in the past 20 years is astounding. And while the interests of the Air Transport Association lie in scheduled airline operations, we are not blind to the value of the private flyer and private airport to the nation. In the next 20 years, the private flyer will serve to keep alive that spirit which has gained aerial preeminance for the United States. And in the next 20 years, air transport will be the leading means of transportation for our people. If we maintain our present leadership, we will also attract a great share of the world's passenger traffic. The carriage of cargo by air should, within a short time, begin to change our entire pattern of distribution. Of course, our military leaders well know the value of our airlines.

S OF FLYING

1947

already was a robust youngster. Compare it with today:

	Certificated Pilots	Certificated Planes	Miles of Airways	Airports	Airline Route Miles
1927	1,572	2,740	4,468	1,036	8,865
1947*	400,061	81,002	40,000	4,703	55,000

*Estimated

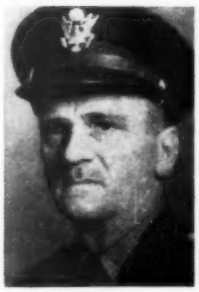
Things amusing get mixed with things amazing. There was the suit by the Wichita chicken farmer who claimed plane noise was cutting down egg production. Hotshot publicity men set up talking mail boxes to promote the use of air mail. (Somebody did it again this year in Minneapolis.) Pilots wore helmets and goggles, even those whose name was not Roscoe or Turner. At Purdue University, Amelia was teaching women to fly. But the most amazing fact of all is that manufacturers offered the lightplane purchaser almost as much then as they do now. Statistics seem to indicate that it's the transport manufacturer who has made these two past decades really count. Here's the record:

	Size	Cost	Speed	Range
		Personal Planes		
1927	3-place	$2,500	95 m.p.h.	300 miles
1947	3-place	$3,000	100 m.p.h.	350 miles
		Transport Planes		
1927	10-place	$50,000	125 m.p.h.	500 miles
1947	12-60-place	$1,000,000	350 m.p.h.	3,000 miles

(*Continued on page* 88)

EDITOR'S NOTE

What lies ahead? Seven leading men of aviation, reflecting on the past two decades, look ahead 20 years to the role of private flying, military and commercial aviation in the world. And these men will do much to make their own predictions become reality by 1967.



Gen. CARL SPAATZ

Commanding General, Army Air Forces

We are no longer living in a world of Great Walls and Maginot Lines. The avenue of the air reaches everywhere and is open to all. The next 20 years hold much in store for aviation. This air age offers many challenges. Educating the public for this new era is a challenge FLYING accepted 20 years ago. Since 1927 its articles and analyses have kept its readers intelligently informed about aviation and its potentialities. It has done so with understanding and determination, and has rightfully earned its position as one of the world's foremost aviation journals. By keeping many people informed, FLYING is helping determine whether that avenue of the air shall be a peaceful thoroughfare, devoted to world commerce and individual pleasure, or a new pathway for aggressors. For the people must decide.

Rear Adm. A. M. PRIDE

Chief, Bureau of Aeronautics, U. S. Navy

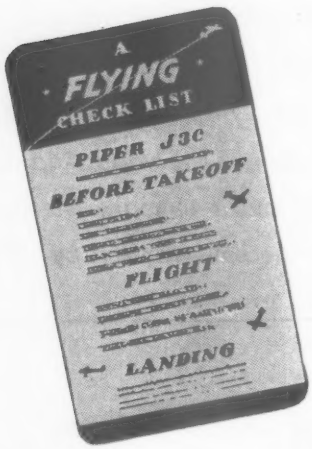
We should soon be seeing some combination of conventional engine and jet-assistance in the personal airplane. Our leading manufacturers are gaining experience in this field because of the work they now are doing with military jet aircraft. Long before the next 20 years pass Navy aircraft will be driven by jet engines, rockets or possibly atomic power. In the past 20 years, FLYING has established itself in the eyes of U.S. Navy airmen as one of the most reputable and valuable publications in the field. When it comes time to wish FLYING a happy 40th birthday, we will find the world has taken to the air even more rapidly than it did these past 20 years. America's future is in the air, and a thriving aviation industry is vital to our national welfare. FLYING will help make that fact clear to America.

T. P. WRIGHT

Administrator of Civil Aeronautics

The private airplane 20 years from now will be a vehicle of far greater usefulness and will be relatively noiseless. Its landing speed will be lower than at present, and its design will include many safety devices. The present 81,000 aircraft in this country will have increased to well over the 1,000,000 mark. Private airports will take two forms: single or parallel strips in residential areas and adjoining small communities, and airports for rotary-wing aircraft—some on roofs of community centers. All airports for personal planes will be attractive community centers. In air commerce, I think the airplane will become an indispensable part of the world's carriers, much more so than it is now. Militarily, the airplane can be a party to the end of our civilization—but it also could police the world.

10 COMMANDMENTS FOR SAFE FLYING



Check list should be mandatory in even the simplest airplane. FLYING is preparing a series of handy check lists for popular personal planes which will soon be made available to all pilots.

By RALPH F. YAMBERT
Formerly Commander, U. S. Naval Reserve

Among flying commandments, one rule leads all others: Follow a check list!

EXPERIENCE is the best teacher, whether you are flying a plane or pitching horseshoes. It is also axiomatic that people learn from their mistakes. The only difficulty with an aviation adaptation of either rule is that flying is the most unforgiving of all human activities. There are a lot of mistakes you don't make a second time when you fly.

There are enough exceptions, however, that the FLYING series, "I Learned About Flying From That—," tallies nearly 100 installments, and still is going strong. A scrapbook full of these articles would provide any flyer with enough lessons from the school of experience to increase his efficiency many times over. In this article I'd like to compress many of the same sort of lessons into 10 simple rules that have helped keep me out of trouble through 15 years of flying—during which time I've flown everything from lightplanes to four-engined Navy *Privateers*. Some of these rules represent mistakes in which Fate has dealt kindly with me; others derive from watching fellow pilots.

Let's begin this business in the cockpit of your airplane. Whether it's simple or complex, you can be certain that every gadget in there has a purpose—things which could make your flight most unpleasant if forgotten.

If you have flown with many different people, as I have, you've discovered that some are dangerously negligent about any sort of a cockpit check—that's why, even in very simple aircraft, take-off attempts have been made with the gasoline selector valve turned to OFF!

I recall the Grizzled Old Pilot who, during the war, brought a *Liberator* to a Navy field to show what it could do. He was one of those pilots with so many thousands of hours that he didn't bother to log them any more. Once he stepped inside the cockpit of his plane, however, he became exceeding meticulous. Before take-off he ferretted out a dog-eared check-off list. He wasn't satisfied with a casual glance at the instrument panel, a hurried check—as he came to a point for checking he leaned over and carefully touched that gauge or handle.

I'm glad I saw that veteran in action. Since then I've always figured that following his example is a good way to become a g.o.p. myself someday. Nowadays, no matter how small the airplane, I furnish myself with a check-off list before I fly it. And that's my No. 1 rule—*use a check-off list.*

Anything worth doing is worth (*Continued on page 77*)

RULES FOR SAFE FLYING

1. Use a check-off list, in even the simplest cockpit.
2. Make your cockpit check-off logically, carefully.
3. Never raise your wheels until sure you cannot land on the runway if the engine quits.
4. Associate cockpit check-off for landing (including lowered gear) with the downwind leg of the landing circle.
5. Associate a gas check with every radio call.
6. Never let a tank run dry.
7. Keep a constant check on wind direction—there can be a 180° shift in fronts.
8. Be your own LSO; don't be too proud to go around if you make a bad approach.
9. Keep your head and your heading.
10. Carry maps that cover at least 50 miles each side of your course.

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77)

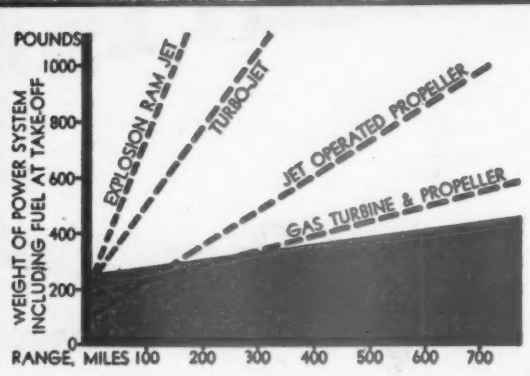
World's largest landplane, the B-36 carries 36 tons of bombs. Its six pusher engines develop 18,000 h.p. and give it a speed of over 300 m.p.h.

Big Boy

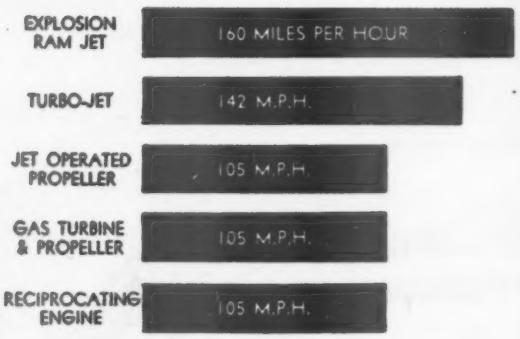
THE U. S. heavy bomber of tomorrow is here today. It is the Convair B-36, a six-engined giant which puts the AAF's previous heavyweight, the B-29, back in the medium class. The B-36 weighs 136 tons and can carry 36 tons of bombs at reduced ranges. It also can deliver 10,000 pounds of bombs onto a target 10,000 non-stop miles away. A transport version, the C-99, could carry 400 equipped soldiers or 335 litter patients. The plane's 3,000-h.p. Pratt & Whitney engines generate a total of 18,000 h.p. There are 27½ miles of wiring in the craft's electrical system. Yet this complex giant is flown by a crew of only 12 men, with four more for relief. Rumored popular name: *Conqueror*.

Dwarfing a man, the B-36's tire is 9 ft. 2 in. high, weighs 1,600 lbs.

Turbojet propulsion is extremely costly in fuel at 100-m.p.h. speed. Consumption is more than 6 lbs. per h.p.-hour, compared with 0.7 lbs. for a conventional engine.



Reciprocating engine weight is least beyond 300 miles.



Ram jet gives highest speeds, assuming same thrust.

What Power For Lightplanes?

Jet types show promise but more research is necessary.

By JOHN C. SANDERS

Mechanical Engineer, Aircraft Engineering Research Laboratory, NACA, Cleveland, O.

IS IT possible to adapt a jet engine to a lightplane? The National Advisory Committee for Aeronautics recently made a study which shows how such engines work out in theory. Four engines were compared with the conventional reciprocating power plants —the explosion ramjet, the turbojet, the jet-operated propeller, and the gas turbine with propeller. Fuel consumption, thrust-weight ratio, aircraft range and maximum speed only were studied—no research was done on comparative costs, safety, or noise.

The engines were considered to apply to an airplane weighing 1,200 pounds and cruising at a maximum of 96 to 105 m.p.h.—in other words a typical lightplane.

At first glance, jets would seem poor competitors to reciprocating engines in the lightplane field.

Fuel consumption, for one thing, appears to be discouraging. Reciprocals are far and away the most economical.

The conventional airplane engine uses only 0.7 pounds of fuel per horsepower hour, as contrasted with the most extravagant of the jets—the explosion ramjet —using more than 12 pounds. Even the gas turbine and propeller, which comes closest to the reciprocal, consumes 1.3 pounds per horsepower hour, nearly twice that used by the conventional engine.

In the ratio of weight to static thrust, however, the jets make a better showing, with the jet-operated propeller much lighter, the gas turbine propeller not as good but not too bad either, and even the explosion ramjet and the turbojet rivalling the reciprocal.

Go one step farther and compare the engines in terms of engine weight plus fuel consumption with a 300-mile range, and even more optimistic comparisons are revealed for some types. The explosion ramjet and the turbojet make poor showings but the gas turbine with a propeller shows up well and the ramjet with a prop is close enough to the reciprocal to be a worthy competitor.

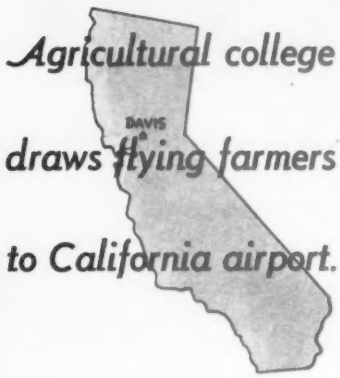
Thus, with range considered, jets may one day become competitors with reciprocating engines.

Leading the parade are the gas-turbine propeller and the jet-operated propeller. The latter's simplicity will tend to make it cheap to buy (*Continued on page 74*)

Gas turbine driving a propeller is most efficient of the jet engines at low speeds required of lightplanes. More research is needed, however.

Jet-operated propeller uses less fuel than a turbojet, more than a gas turbine. It is light in weight and would be cheap to build and maintain.

Student Dian Dittelson rents horse from stable connected with airport.



Farmers' Air Center

By DOUGLAS JAQUES

UNIVERSITY AIRPORT, near Davis, Calif., is unique for a couple of reasons, but mainly because 75 per cent of its operations come from flying farmers. There is scarcely a section of California from which a farmer has not flown his own plane to this field.

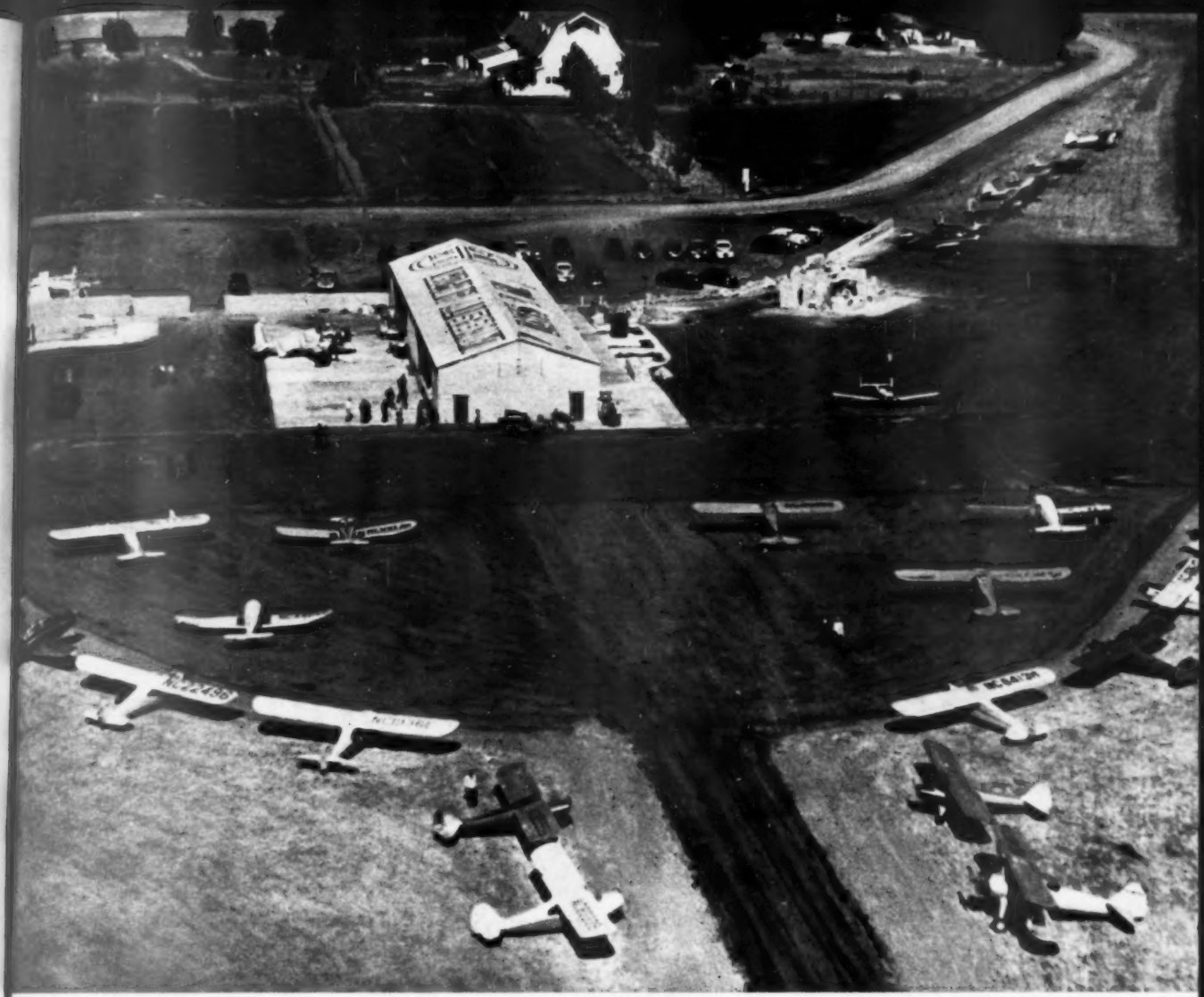
It is situated in one of the richest agricultural areas in the west. It has had $200,000 already spent on it and another $300,000 in construction has been ordered. As it exists today, it has three runways and two supplementary, emergency runways. The longest strip is 3,700 feet long and can be expanded to a mile if operations warrant it. The other two regular runways are 3,600 and 2,500 feet long, respectively, and the supplementary strips are each 1,800 feet in length. All of them are 150 feet wide and surfaced with pea-gravel, the most expensive and workable available.

There are hangar accommodations now for 25 planes and tie-down space for 50 more. The people in charge of University Airport boast they can expand their facilities to accommodate 500 planes if business warrants because, they say, they have endless room in their fertile valley.

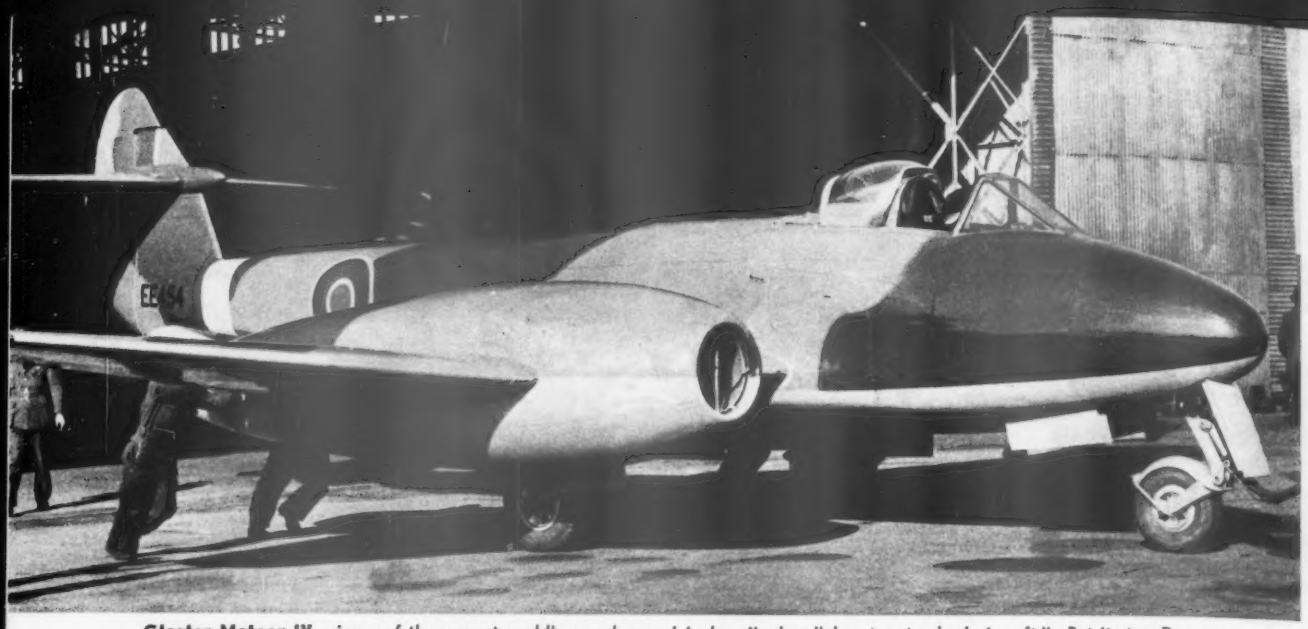
The three hangars are usable but not yet "fancy" because of material shortages. They are built of steel (*Continued on page* 91)

Regular customers at airport are J. S. Winters, vice-president of California Flying Farmers, and Roy Mattley, manufacturer.

Family of Flying Farmers are Norman Baker, an "ag" student, and his wife Gerry, talking with parents Mr. and Mrs. Frank Baker.



Flying farmers make up 75 per cent of the customers of University Airport. Above, group of flying farmers is discussing a flying trip to the San Joaquin Valley. Below, planes on parking area during last October's convention of flying farmers. Proximity of the University of California's College of Agriculture and its experimental farms makes the airport a magnet for flying farmers throughout the state.



Gloster Meteor IV, winner of the current world's speed record is described as "almost a standard aircraft." But its two Derwent turbojet nacelles were lengthened, the windscreen modified and gun apertures blocked out flush with nose surface for extra speed.

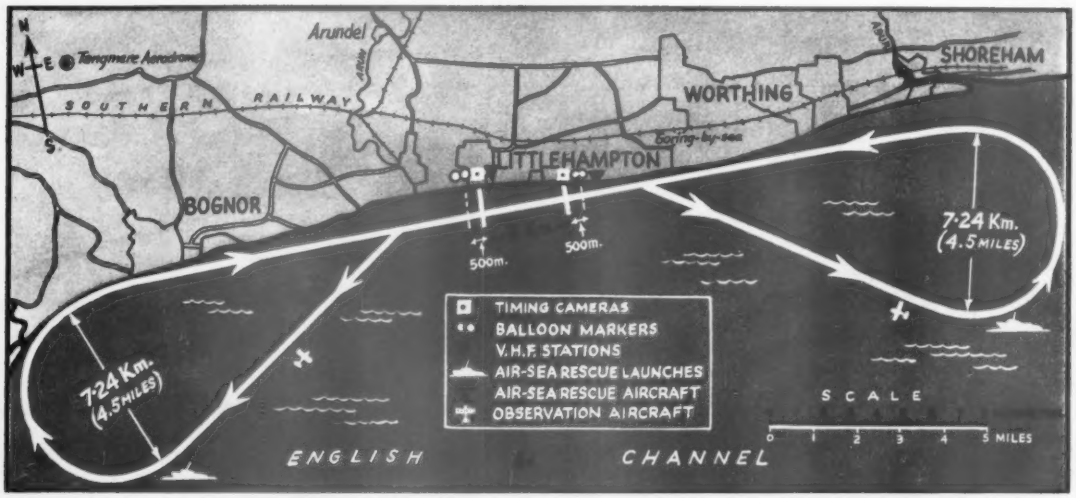
Breaking the World's Speed Record

By Maj. OLIVER STEWART

Editor's Note

At present the British Meteor *is officially the world's fastest plane; although in two world-record attempts in America (made at the Muroc Army base in the P-80-R and the P-84), the P-84 tallied a slightly higher speed. Major Stewart, British aviation authority and editor of* Aeronautics, *explains here the rules governing such competition.*

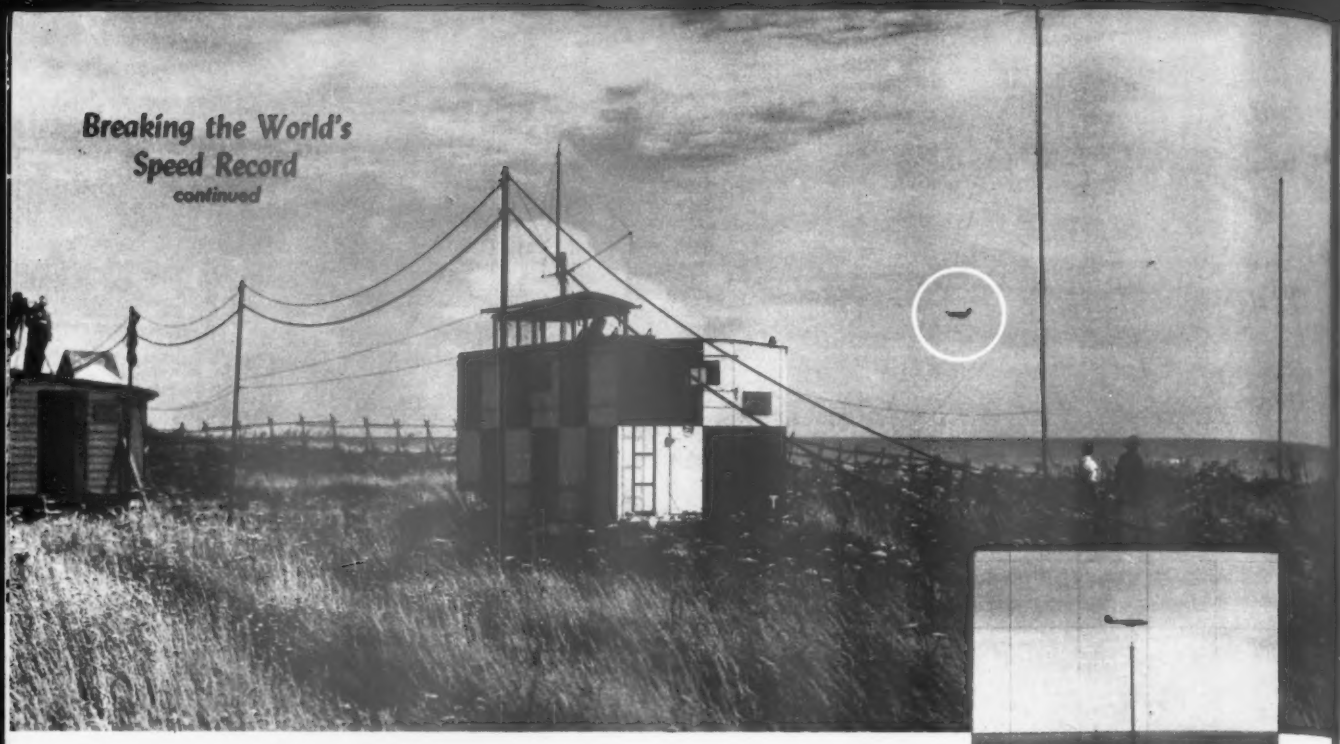
MAN will fly faster this summer than ever before. His speed may be somewhere very near, if not beyond, that of sound. Any official attempts to establish new speed records—to cross the mysterious sonic barrier—will be measured by meticulous international standards set up long since by the *Federation Aeronautique Internationale.* While few will ever participate in such competition an understanding of it is important to everyone who flies. The reason is that even the slightest advance toward crossing the sonic barrier indicates increasingly that the barrier may prove a dividing line between planes and power plants we now use and an entirely different

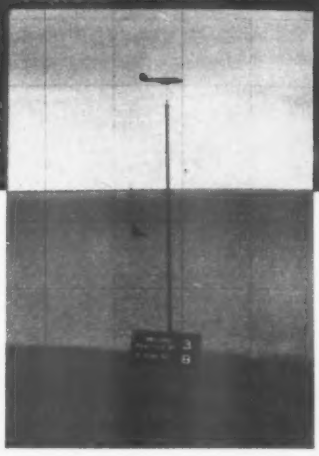


Course where world's record was set last year lies off English coast at Littlehampton. Approach to the three-kilometer (1.86-mile) base was made with a left turn at the east, a right at the west. Average speed of two consecutive runs each way is taken for record.

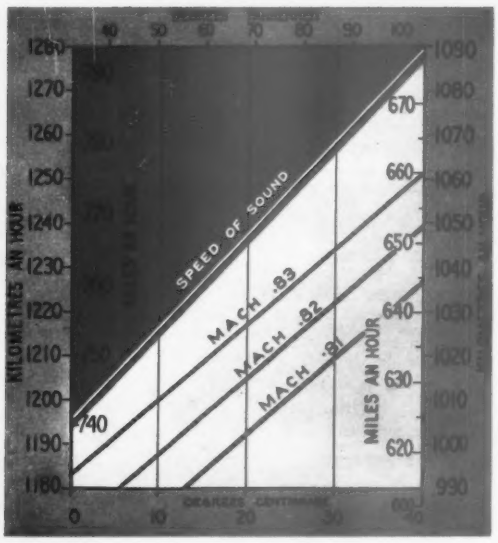
Beginning trial run for world record flight (1946), Meteor flashes by control point where cameras time entry into regulation 1.86-mile course to 1/100th of a second. Balloons mark F.A.I. altitude limit (246 feet) for the run. V.H.F. radio setup coordinates the work of course controllers, observers and other officials.

Breaking the World's Speed Record
continued





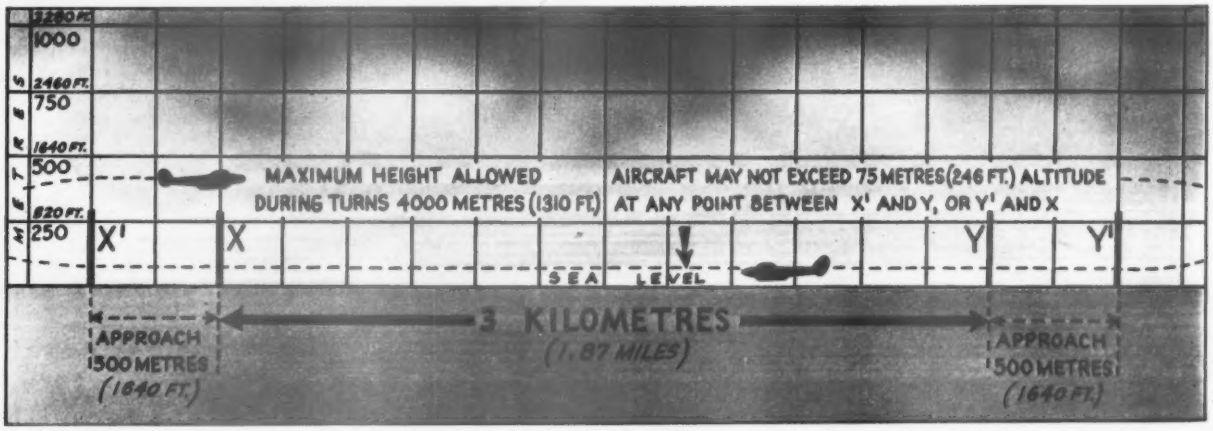
On practice run, "slave" Meteor (circled above) makes turn into eastern end of the Littlehampton course as controller (checkered hut) signals cameramen (left) and other officials to begin multiple measurements of performance. Wires (foreground) coordinate high-speed photo timing of start (inset) and finish of run.



Graph shows how temperature is related to sonic speed.

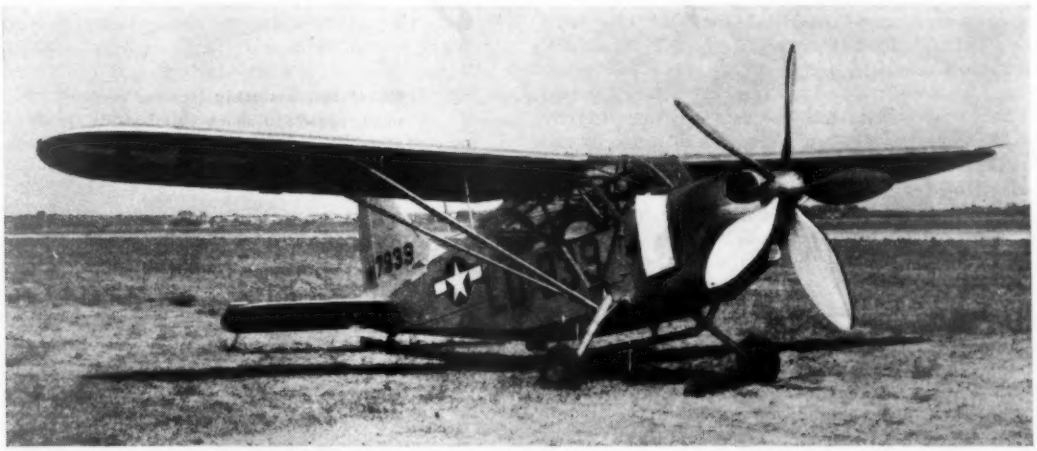
sort we may need in the world of tomorrow. In light of the importance of each new step in that direction, here are the mechanics of how world speed records are set and how they can be broken.

The present world's record was established last September in a *Meteor* EE 549 piloted by Group Capt. E. M. Donaldson of the RAF, the speed attained was 991 kilometers (616 miles) an hour. Other British and American attempts on the record have been made since then, and the higher speed of 996.18 kilometers (619 miles) an hour was achieved in the American P-84. But the F.A.I. requires that a previous record be bettered by at least five m.p.h.—so the British record still stands. Other attempts to (*Continued on page* 60)



F.A.I. course requirements for attempts at world speed records are devised so all observations and measurements can be made from points outside the plane itself. Only metric measurements are official since test instruments used were devised for that system.

REPORT FROM WASHINGTON



Five-bladed propeller on this AAF L-5 reduces tip speed to cut noise from 90 to 66 decibels.

By FRED HAMLIN

LOOK for three new technical developments to continue making news in Washington. One is the five-bladed propeller developed by the National Advisory Committee for Aeronautics as a way to solve the noise problem. All we can say is—boy, howdy, it sure does! We saw the NACA silent version in action the other day on an 185-h.p. Stinson L-5, teamed with a conventional L-5. They flew over at 300 feet—first one, then the other, then together. The conventional made like anybody's putt-putt. The noiseless, complete with muffler, whistled like a summer breeze through a screen—ve-ry softly. You wouldn't have known it was around if you hadn't been alerted. Later, to make sure we weren't dreaming, we went over to look at the noiseless on the ground. It wasn't there when we arrived but while we stood around talking to some of the boys who had worked on it, it literally slipped up behind us. Quieter than an automobile, no kidding.

How Husher Works

Principle of the quiet prop is to move it more slowly through the air, while getting comparable power. The five-blader goes 1,000 r.p.m. as contrasted with the conventional 2,500. This, plus muffler, drops the noise level from 90 decibels to 66—"probably greater than necessary," say NACA engineers. They say the job cost about $25,000, and they lay no claim to its being ready for production. The muffler, for instance, is as big as a hot-air furnace pipe. We talked to one of the test pilots, S. A. Cavallo, and he added that the muffler installation made the cabin unduly hot. Muffler pipe goes under the seat. The plane performs as well or better than the conventional—even cruises from five to 10 m.p.h. faster, and climbs better. Cockpit is as noisy as ever, though, we're told—the usual wind-in-the-struts noises, plus some tinny ones from metal in the fuselage. Cavallo says that, surprisingly, the wide blades—14-inch butter paddles with tapering ends—don't interfere with forward vision. He says the plane is slightly more nose heavy—the five blades weigh about 80 pounds. . . . How soon you will be able to have a comparable prop and muffler installed on your plane is an unanswered question. NACA's role is research; next step is up to the industry. Their engineers are skeptical, for cost and production reasons; but bleats from those who live close to community airports, louder now than ever, may force the issue.

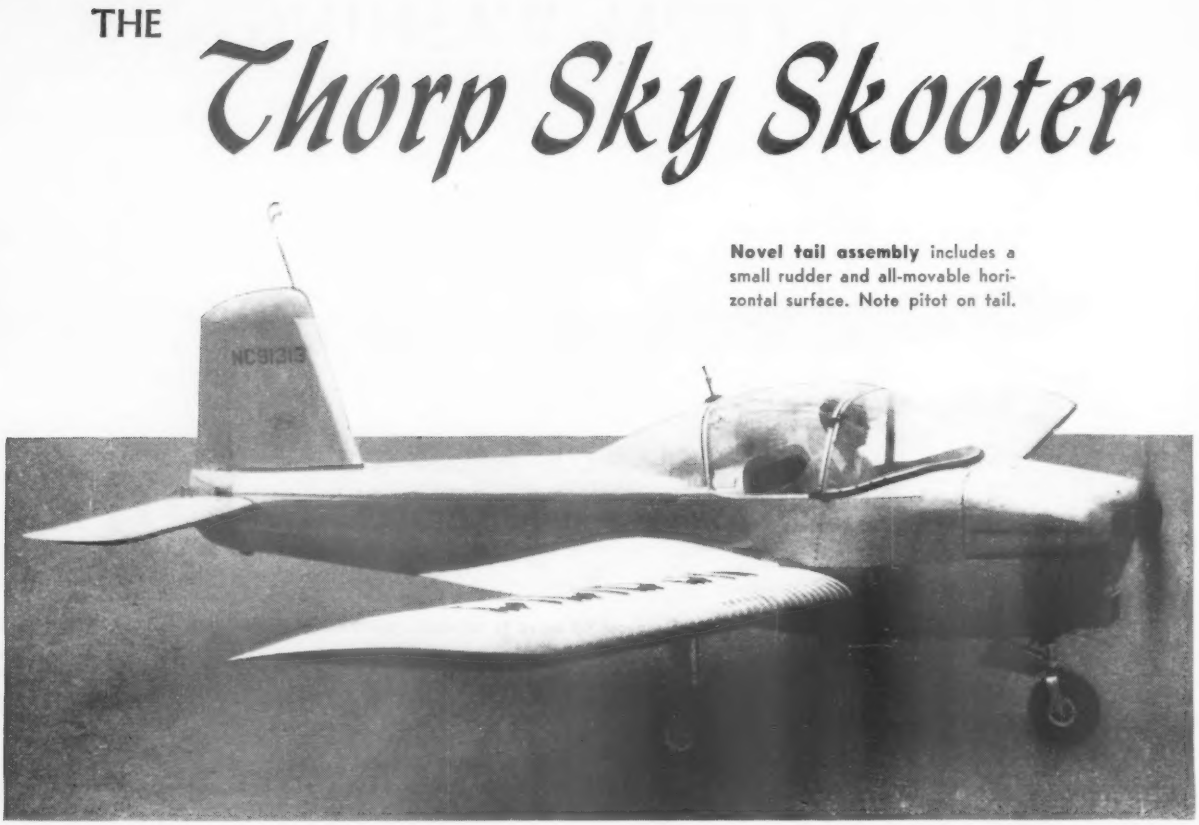
Facts About ILS

Whether you are pro or con on the Civil Aeronautics Administration's instrument landing system (ILS), the fact remains that it is going to figure in air transport news from here on in. So—the more facts known about it, the better. Here are some of those facts: Not long ago a CAA-ATA survey was made of 18 ILS installations in operation. Most were reported in excellent condition. Three localizers, however, were found "poor . . . unstable"—at Newark, Kansas City, and Chicago. Now comes a report from a pilot saying that the Newark job is worse than poor—it smells. Two major objections are raised: "the glide path (on take-off) took us within 25 feet of the towers of the Newark beam station" and "the ILS transmitting station is *behind* a main industrial highway, one of the most heavily traveled in the country; it is filled with trucks, any one of which may throw the beam off." To this CAA replies that anybody who knows anything about ILS knows that it doesn't work in reverse, on take-off; that the clearance of the range station towers is 205 (not 25) feet; and that the transmitting station beam goes above highway traffic and therefore is not bothered by it. During experiments, it was bothered by planes taxiing on the field, but the new taxi patterns have eliminated this difficulty.

Truck Trouble

Truck trouble seems to be a major problem. Another correspondent describes a recent cockpit experience: "The pilot flipped a switch and ILS took over entirely, the pilot and the co-pilot sitting (*Continued on page* 89)

THE *Thorp Sky Skooter*



Novel tail assembly includes a small rudder and all-movable horizontal surface. Note pitot on tail.

Excellent visibility is one feature of the Sky Skooter. Nose wheel is steered with rudders. "Beaded" wing and tail can be seen.

SOME personal airplanes are fun to fly, some are just hard work. So far as I am concerned, the *Sky Skooter* gave me two of the most enjoyable flying hours I've had in a long time. Its simplicity and amazing ease of control left me with a warm spot for this little orphan.

The *Sky Skooter* is an orphan because John Thorp, its designer, has neither the money nor the factory with which to build it. And if the times were anything but what they are at the moment, production of this little lightplane would be almost a sure thing. Yet, despite these handicaps, Thorp went ahead with his prototypes and got an Approved Type Certificate.

This interesting little monoplane is a direct outgrowth of the much-discussed but little-seen Lockheed *Little Dipper,* a tiny single-seater which Thorp and men on his present staff designed while they were at Lockheed. Everyone who flew the *Little Dipper* came away excited—even the tough, reactionary old-time pilots who resent seeing airplanes get so simple. More people should get to fly the *Sky Skooter;* the reaction should be just as enthusiastic.

I flew this interesting airplane in California recently. It was the kind of a Los Angeles day that Bob Hope kids about. There could be none of the usual business of timing rate of climb, trimming for stability, and that sort of thing. The main problem was to keep right side up. It was about as rough and unpleasant a day as I've flown in.

But even under those conditions, the Thorp was most pleasant to fly. With two of us aboard, the little ship popped right off the ground and climbed at a steep angle. As closely as I could figure it, we were getting a bit better than 600 f.p.m.; Thorp claims 650 for the *Sky Skooter.*

The take-off is typical of the tricycle-geared airplane. You give it full throttle, let the nose wheel stay on the runway so you can steer it (with the rudder pedals), then pull the stick back as soon as you have flying speed. Take-offs can be made with or without partial (15°) flap; I used the flap a couple of times and the plane was off the ground within a few seconds. One interesting—and safe—point I found: you can accidentally or deliberately pull up the flap during take-off, or at any time close to the ground, and the *Sky Skooter* goes right on about its business as though nothing happened. And yet, that flap is extremely effective in steep approaches to landing.

As I mentioned earlier, the Thorp has the lightest controls I think I have ever found on an airplane. The engineers say the system is virtually frictionless; the whole thing's fitted with ball bearings. I found I could operate the elevator or ailerons with less physical effort than it takes to push a salt shaker across the table. I could feel the faintest tremor as the slipstream, moving over the control surfaces, moved the stick. Yet, even in that rough air, the *Sky Skooter* was practically effortless to fly. Those light controls worked a bit in reverse, as a matter of fact. Whenever I moved around to look outside or do something not directly connected with the flying of the airplane, I found I would inadvertently move those feather-weight controls just the tiniest bit—but just enough to put the ship in a shallow bank, dive or climb.

Stall characteristics are excellent. At about 48 m.p.h. the Thorp mushes along straight ahead. Just the slightest forward pressure on the stick and you're back in level flight. Even the ham-handed amateur should be able to take care of himself when this ship stalls.

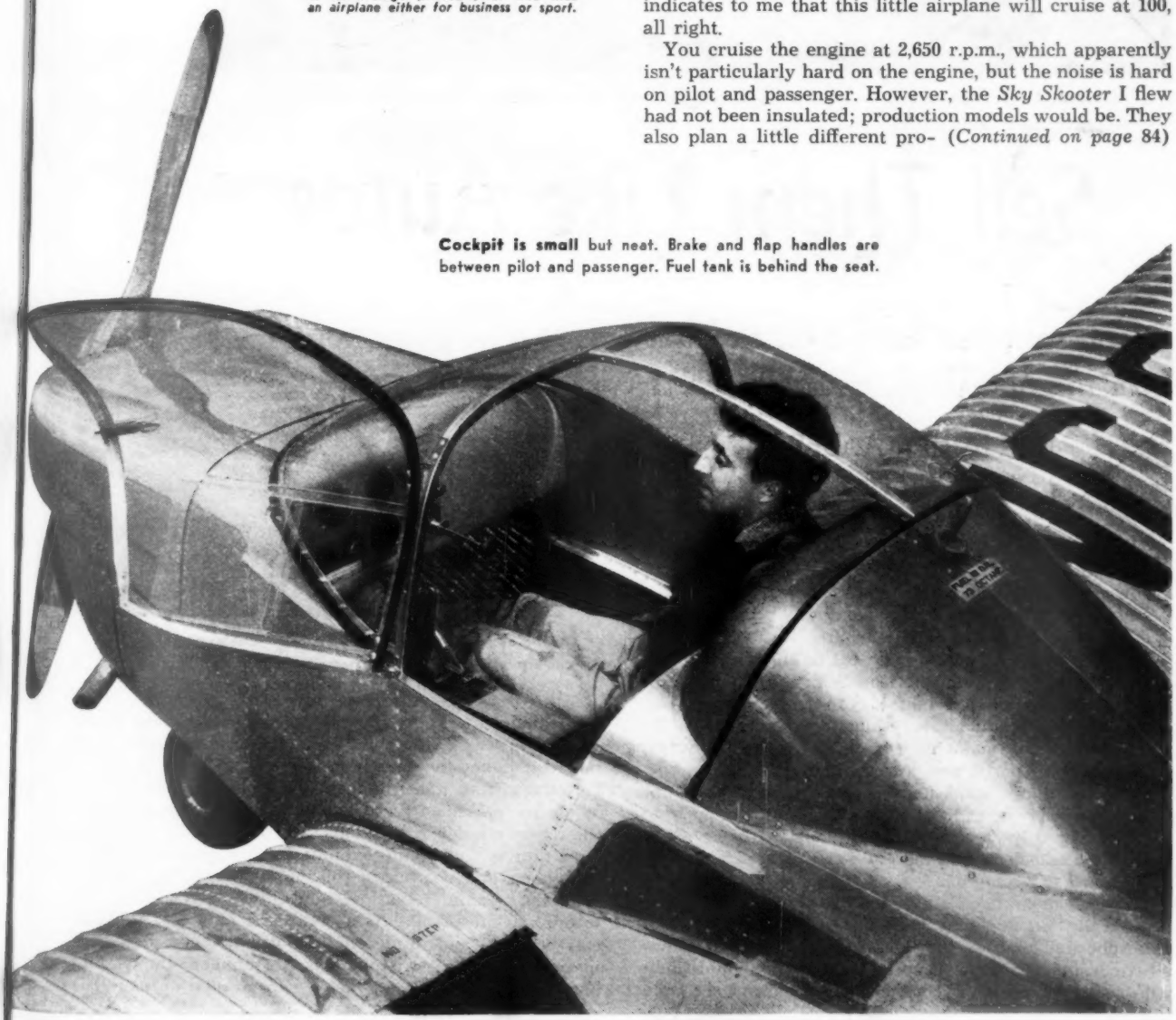
Thorp claims the *Sky Skooter* cruises at 100 m.p.h. with its 65-h.p. Lycoming engine. So I set out to fly a triangular course between three widely-separated Los Angeles airports. As I say, it was an extremely rough day, and the visibility was even worse than it normally is around Chicago or Pittsburgh. Despite these drawbacks, the *Sky Skooter* gave me a ground speed of 97.5 m.p.h.—which indicates to me that this little airplane will cruise at 100, all right.

You cruise the engine at 2,650 r.p.m., which apparently isn't particularly hard on the engine, but the noise is hard on pilot and passenger. However, the *Sky Skooter* I flew had not been insulated; production models would be. They also plan a little different pro- (*Continued on page* 84)

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Approved Type Certificate are flown. The author is not a professional test pilot. He evaluates each aircraft through the eyes of an average private pilot who flies an airplane either for business or sport.



Cockpit is small but neat. Brake and flap handles are between pilot and passenger. Fuel tank is behind the seat.

National Aircraft Show at Cleveland last fall is typical of expositions where airplane salesmen fail, author says.

Sell Them Like Autos

Plane salesmen have a lot to learn from the auto boys, declares expert.

By HARRY A. BERK

Director and Vice President in charge—International Division, Foote, Cone & Belding, Advertising Agency

A VISIT to the Aviation Show in Grand Central Palace recently dramatically brought home to me what's wrong with the small plane business.

The answer, as far as I am concerned, is just this: *They don't sell them hard enough!*

Now I realize that perhaps the entire answer isn't that simple. The history of American transportation, as you well know, has proved that if you can create public demand for a product, everything else that has to do with production, maintenance, roadways or skyways, highways or airports, and lower prices follows.

I believe my own experience at the show was no doubt typical. Here is what happened:

I went there interested in small planes. Maybe a hot salesman could have sold me one—or at least started me on the road to buying one.

You will first have to assume that I was fairly well dressed at the show, and while I do not exude a general atmosphere of cash on the line, a salesman never knows where his next sale is coming from. The young lady who accompanied me had on a good mink and a couple of diamond bracelets. She is also planning to take flying lessons. At an automobile show a salesman would have hung on to her for dear life.

Automobile show offers examples of good salesmanship which the aircraft industry should study and adopt, Mr. Berk asserts.

Nothing like that happened at the aviation show. While the salesmen were lackadaisical enough with me, they ignored her completely.

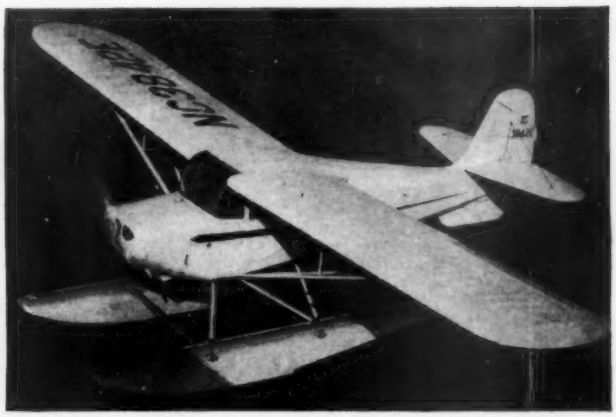
At four or five of the exhibits I asked questions about the planes and got pretty routine answers.

At four exhibits I asked how much it cost per mile to operate the plane. As a motorist I naturally think in cost per mile and to me one of the major considerations in purchasing a small plane is the upkeep, the cost of hangar space, etc.

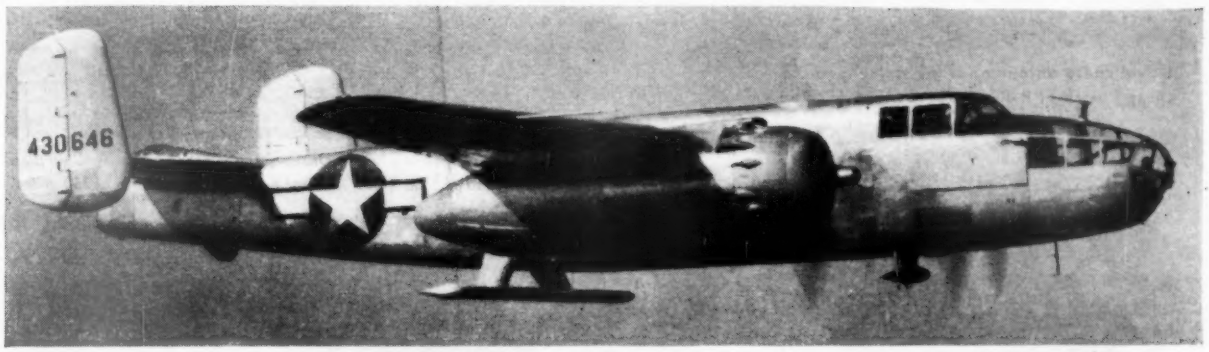
(*Continued on page* 84)

HAVE YOU SEEN?

Doctor's stethoscope is used to check for air leaks in pressurized Northrop YB-49 cabin. Leaks are closed with sealing compound.



Aeronca Scout, new stripped-down version of Chief, has 65-h.p. engine, is 80 per cent interchangeable with Chief and Champion.

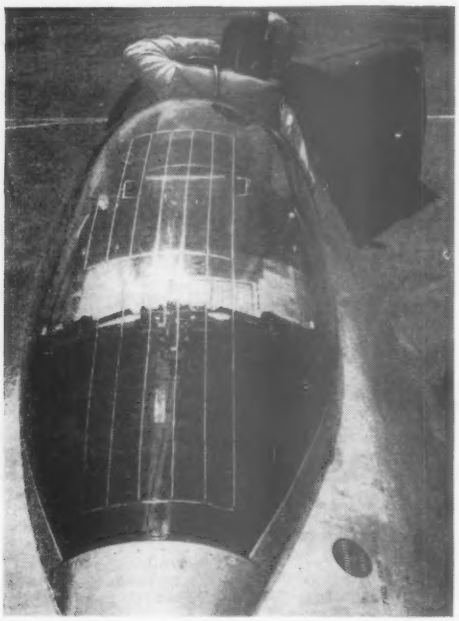


"Eagle" radar antennas were installed on five B-25's to be used as B-29 crew-trainers. Antenna was mounted under fuselage and consisted of a true airfoil 18 feet long. "Eagle" was used over Japan.

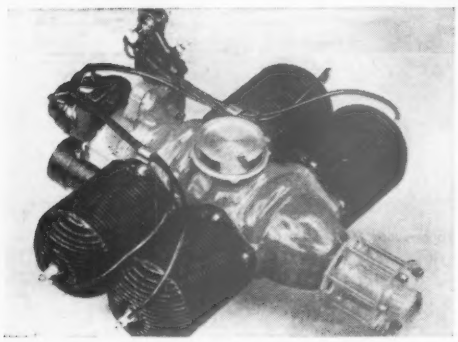
Bearcat take-off at Cleveland air show was made in 115 feet. Plane then climbed to 10,000 feet in 100 seconds. Photo shows wheels leaving ground.

HAVE YOU SEEN?

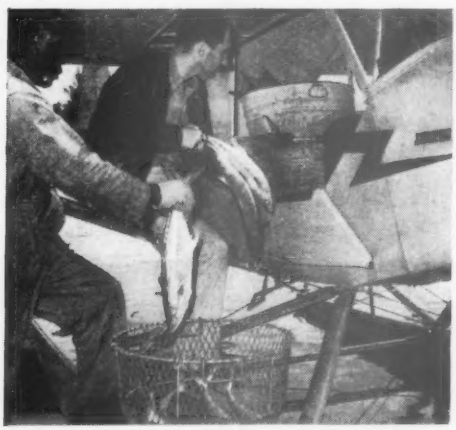
(Continued)



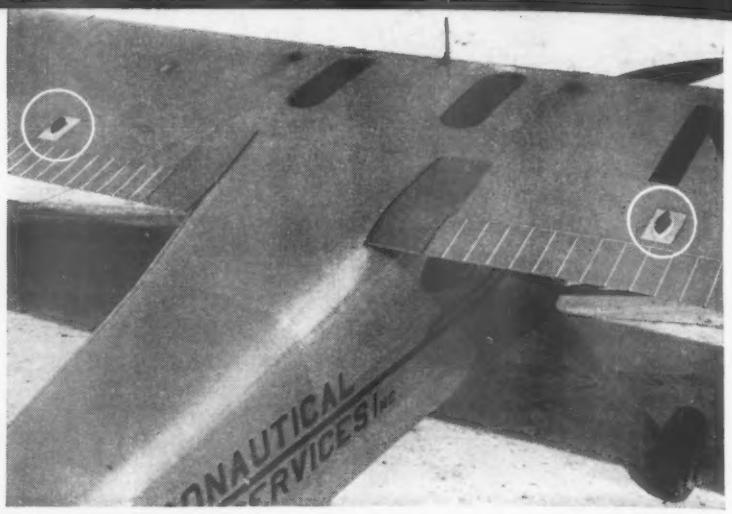
Novel radio antenna now are strung inside the cockpit hatch of P-80's to reduce drag in flight.



Two-cycle 60-h.p. McCulloch target-plane engine weighs 74 pounds, may go in new lightplane.



Fresh seafood is flown from Gulf of Mexico to Naples, Fla., hotel daily in a Cub seaplane.

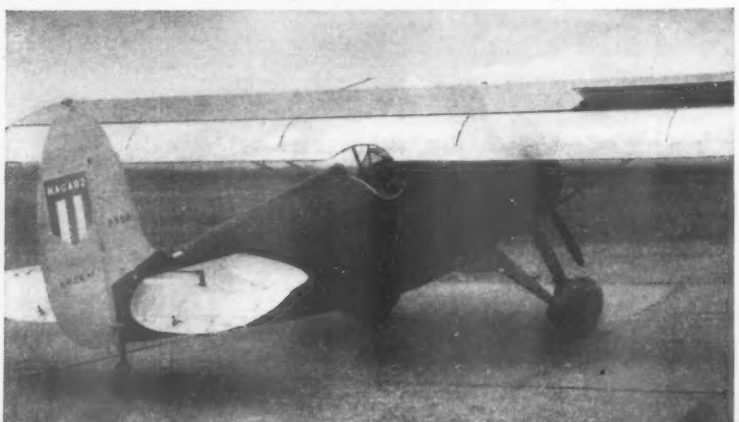


Arnold stall-warning indicator, newest such device, has one or more detectors on top of wing which actuate light and horn in cockpit, can run on dry batteries.

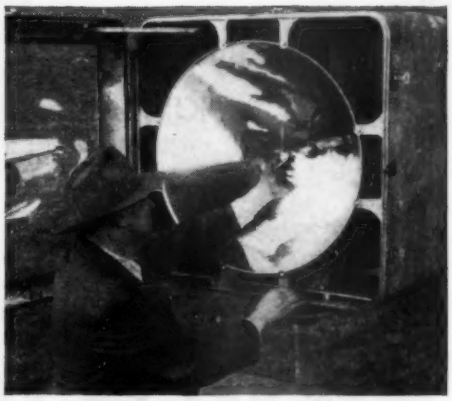
Avro Anson with 450-h.p. American Wasp, Jr. engines is being used by Canadian operator. It cruises at 150 m.p.h., stalls at 60. Range fully loaded is 750 miles.

Bellanca Skyrocket is again being built in Canada under license from U. S. company. It has 550-h.p. engine, cruises at 160 m.p.h. List price in Canada is $34,000.

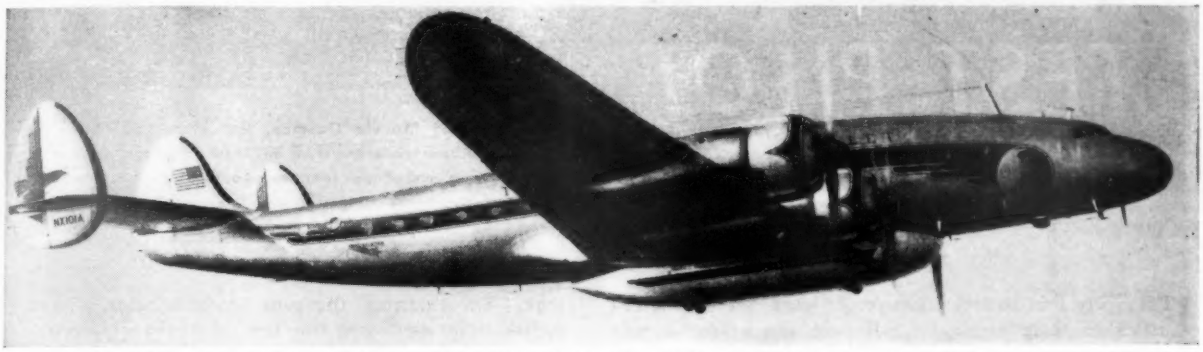
Fairchild XR2K-1, borrowed from Navy by NACA, was used to test Zap flap. In picture below note extended flap and raised aileron. Similar flap was used on B-29.



"Canned" fighters are put up by Navy for possible use during next five years. This Hellcat is in steel cell; small bags absorb water, hold humidity at 30 per cent.

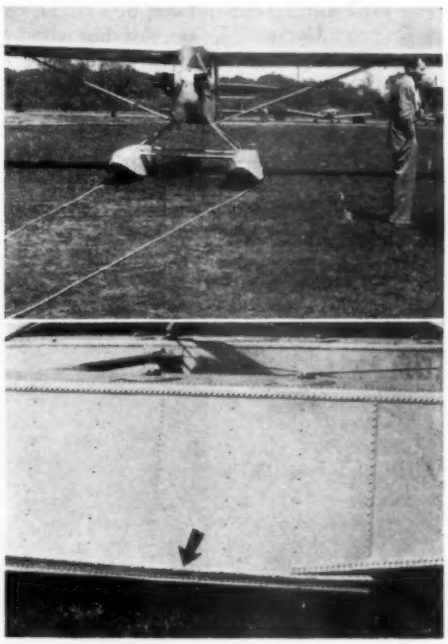


Airport fog light develops 3,300,000,000 candlepower, can penetrate 1,000 feet of dense fog.



Newest Constellation has 2,500-h.p. engines and detachable "Speedpak" under belly for cargo. It carries 60 passengers and 5,700 gallons of fuel. Gross weight is 102,000 pounds, range 5,200 miles. The passenger cabin floats free on rubber mounts.

Track-type landing gear soon will be used on AAF Packet (above). Gear was first tried out on a bomber (inset).



Land take-off with seaplane was made recently by Wisconsin pilot. Rope was hooked behind float step (arrow). Tow truck pulled plane off.

Lend-Lease C-47 is being used on Russian airline. Though it carries Soviet star, it still has original AAF serial number on the vertical fin.

By
PETER W. KILLIAN
Pilot, American Airlines

BE YOUR OWN TEST PILOT

Pilot Marvin Cosman, instructor at Arlington (Ill.) Airport, checks actual airspeed of Luscombe after making test flight procedure outlined by Author Killian.

Photographs by N. R. Strohmeyer

IT'S a pity that so few pilots really know the characteristics of their airplanes. By making a few simple experiments they can become much better acquainted with them and enjoy flying more.

The simple tests proposed here are not meant for any one type of airplane but can be applied to any ship, from a *Cub* to a *Corsair*. I dare say that when you are finished you will have much more definite ideas on the performance of your plane than you do now.

So . . . grab yourself a note book and pencil and let's go for a ride.

First of all, find out at what speed the old buggy cruises. Now don't shake your head and say, "why that's easy, it goes 90 per." Are you sure that it really goes 90 or do you just think so? Have you checked the airspeed for installation error or maladjustment? There are a hundred reasons why an indicator does not read true. For example, the pitot static tube is seldom installed in an airstream free from disturbances created by the structure of the aircraft. This error caused by the differential pressure developed is known as the installation error.

Now all you need is a straight line on the ground, preferably a good straight highway or high tension line to follow for a straight flight path.

It should be at least four miles long—10 or 15 miles would be better. Measure the distance on a sectional map and then pick a day with no wind or have the wind blowing parallel with the course. You are now going to fly this course at different airspeeds, say each 10 m.p.h. from cruising airspeed to an airspeed just above the stall. If your plane stalls at 40, you will fly the course at 50, 60, 70, 80 and 90.

You will accurately time the course in each direction

True airspeed is best checked by flying a measured course when no wind is blowing, and timing the flight. Here Cosman flies along a straight highway over a distance laid out on his sectional air chart.

Stalling characteristics of airplanes vary with power and gas loading. They should be checked under all conditions. Pilots should also check magnetos for loss of r.p.m.'s before landing. Luscombe cruises at 2350 (top, left). Drop of 50 (center, left) might be acceptable, but drop of 150 (lower) would not be.

at each indicated airspeed to be calibrated, holding airspeed as constant as possible. You determine the groundspeed for each leg, add the two, and then divide by two, which gives the average ground speed or the true airspeed. Simply correct this true airspeed for temperature and altitude and you will have the indication which should be shown by the airspeed indicator.

By making these tests at a low altitude of 500 feet you can almost forget about the altitude correction and only correct for temperature. This will give you the correct airspeed for your indicator throughout the whole range. You know now exactly how fast your ship goes and you aren't kidding. It's a good idea to make a small correction card and place it on your panel beside your airspeed indicator. No matter what your indicator reads you now have an accurate figure of your airspeed.

Now that you can rely on your airspeed indicator, find out the stalling characteristics of your particular plane. Don't let me hear you say, "according to specifications it stalls at 30 or 40 or some other figure." At what weight is that figure? Is that with or without flaps? Is that with or without power? If you can't answer these questions let's go for another ride and find out.

If you have an airplane without flaps or retractable gear the problem is a little simpler but there are still a few variables such as the amount of gas carried, whether dual or solo, and the amount of power carried. Even in a lightplane carrying only 12 gallons of gasoline, the extra 70 pounds (six pounds per gallon) makes a difference.

First, climb it upstairs for the stalls because then you can pay more attention to the readings and also prevent the possibility of coming in a little "hot" and so obtaining readings somewhat on the high side.

Stall the plane solo with no (*Continued on page* 80)

Exact fuel consumption is knowledge every pilot should have. Cosman checks gauge to see how much the Luscombe has taken.

Oil consumption is roughly 20-1 to gasoline consumed. It should be watched and the mechanic notified if it is high.

I Learned About Flying From That! NO. 93

Forget your rush to get home when fog begins to cover those check points.

By

BROOKE L. JARRETT, Jr.

Author Jarrett checks a weather map in preparation for a cross-country—a precaution he never fails to take since he let down to tree-top altitude to find the ground.

SEVERAL articles have appeared in these columns concerning planes lost in fog, their pilots bailing out. Each time I read one I said to myself, "But what about the little fellow who has no parachute?" That was me on a deceptively clear day last December.

My 40 h.p. J-2 *Cub* had just been majored at a Delaware airport near the ocean and I was anxious to try it out and get home. I had already spent three days of mounting impatience in the off-season resort town waiting for a heavy rain to stop.

When, on the fourth day, the early morning sun shone brightly on the airport, I jumped into my plane and took off for Washington. As I climbed for altitude I noticed wisps and tiny patches of cloud at 200 feet, but the sky above was so clear, and I was so glad to be on my way, that I put them out of my mind. I flew along at 2,500 feet, seeing just enough of the ground through the increasingly large puffs of cloud to double check my heading. After about 20 minutes I noticed that the ground was very seldom visible. That was the time I should have changed my stubborn plans.

But it was cozy and warm up there, even in a J-2 *Cub*. And the billowing expanse of cloud below me was very beautiful. So I went, only not so light-heartedly now. Worries about my small fuel capacity, what sort of ground speed I was making, whether the Washington area also was solid overcast—these began to plague me. The smiling sun took on a malevolent gleam and the clouds beneath me were no longer soft and pillow-like. They were cliffs and chasms, suggesting a suicidal jump. My gas was running low. I had a head wind, and solid clouds stretched behind and ahead of me as far as I could see. That was the time to bail out—if I had had a parachute.

Without that means of salvation I had to make other plans for getting myself down to earth. According to the best calculations I could make with my inadequate instruments, I was over Chesapeake Bay. If I had to go down very far through clouds I wanted to come out over the low, flat water.

I bolstered up my courage and slowly nosed down into the opaque mass of cloud. It was my first experience at flying blind and I was little prepared for the terrors to come. The warmth of my sunlit course above changed suddenly to chilling cold within the cloud. Moisture immediately fogged my windshield and then began to freeze. In a panic I tugged at the catches of the windows and got them open. That made it colder still, and with the mixture of cold and fear I was almost rigid.

My mind raced over all the things I had read or heard about flying without visual reference to the horizon. Vivid pictures of steep spirals and spins grew before my straining eyes. I had just decided that it would be best to let the ship fly itself as much as possible when I was suddenly jolted and bumped by violent turbulence and I had to grasp the stick tightly. Then my compass card started to spin around and my troubles had really begun.

Quick glances away from my meager instruments revealed a thin sheet of ice forming on my struts. Thinking of the consequences of a similar sheet on my wings made me shudder. I kept my eyes inside the cockpit and concentrated on juggling the instrument readings. "Try to keep the compass card still," I told myself. "Not too much airspeed. . . . Engine throttled back . . . but not quite so far—it might quit." Fortunately I had remembered the carburetor heat, and the only good thing I can think of from those tense moments is that the newly overhauled engine kept up its steady putt-putting. Had it missed, my hair would surely have turned white.

Immersed in the grey twilight of the cloud I felt terribly alone. I tried to pierce the smothering swirls of moisture to see some familiar thing, my eyes darting from the altimeter to the void and back to the altimeter. It unwound slowly, inexorably, and as it neared zero I looked around almost frantically for trees, wires, radio towers, or any other projection my frail plane might hit. But there was nothing. When zero appeared and was passed I gave up the altimeter and kept my head craned out the window, in the tearing slip-stream. The turbulence was still violent and I couldn't be sure from one minute to the next just what attitude my plane was in. But I had no time to worry about that, since I was concentrating so hard on the possibility of an obstruction looming suddenly out of the fog.

Although I had been expecting it for minutes, it was a surprise when I realized that I was no longer looking at grey

(*Continued on page 92*)

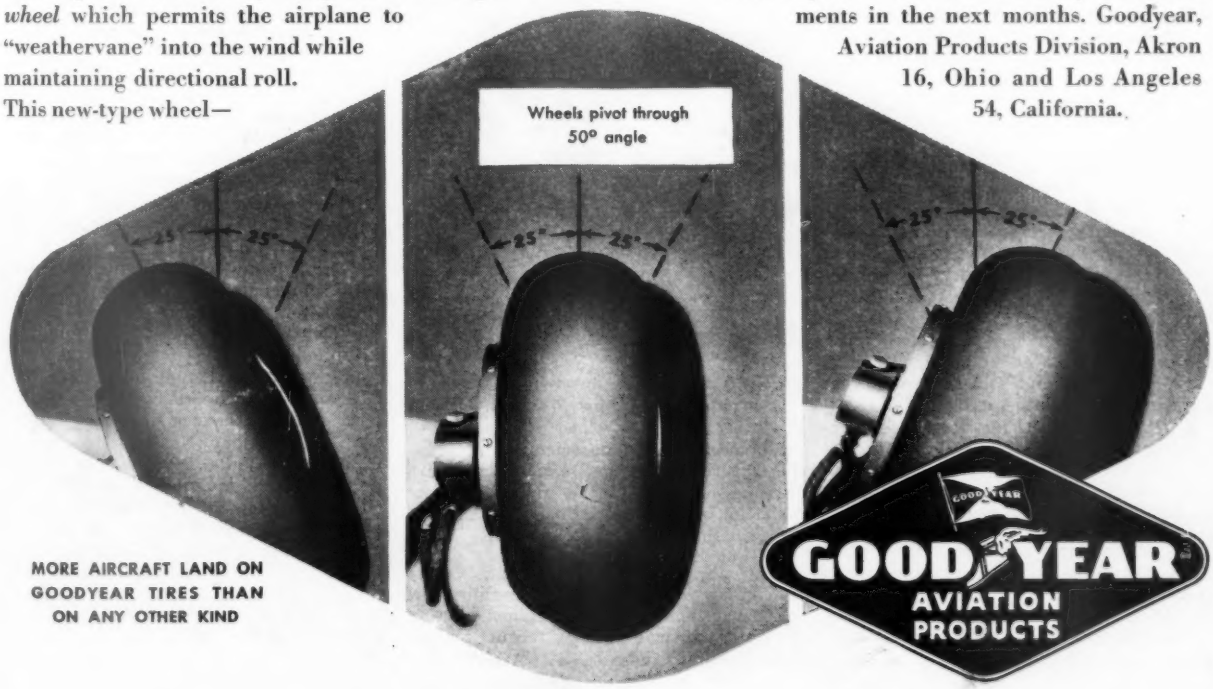
Coming—
a proved and practical

CROSS-WIND LANDING WHEEL

Safety on one-strip fields regardless of wind direction!

Commissioned by a CAA contract to develop a landing-gear device that would make possible straight-line take-offs and landings *crosswind*—thus proving one-strip runways practical—Goodyear has engineered a device that does the job *without* special pilot training. Avoiding a costly landing gear, Goodyear engineers came up with a relatively inexpensive landing *wheel* which permits the airplane to "weathervane" into the wind while maintaining directional roll.

This new-type wheel—fully automatic, and requiring no special levers or controls—returns to normal "in line" position when airborne, *casters instantly* upon runway contact. Veteran pilots were skeptical—until they proved it themselves *without special instruction* in winds up to 30 mph. Goodyear is pushing work to get this revolutionary wheel to you. Watch for availability announcements in the next months. Goodyear, Aviation Products Division, Akron 16, Ohio and Los Angeles 54, California.



MORE AIRCRAFT LAND ON GOODYEAR TIRES THAN ON ANY OTHER KIND

GOODYEAR
AVIATION
PRODUCTS

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun." Headquarters are: 1319 F Street N.W., Washington 4, D. C Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

SPEAKING of problems confronting the Radio Technical Commission for Aeronautics, J. B. Hartranft, Jr., general manager of AOPA, recently compared the wartime, omni-directional installation program with the blindly infatuated who "marry in haste, repent in leisure."

"During war years," Hartranft pointed out, "military demands resulted in the use of Federal funds in procuring some 500 omni-directional radio ranges. Needs of private aviation were overlooked in the haste of devising an advance military form of navigational aid.

"It appears we shall repent (or, at least, that the Civil Aeronautics Administration must"), he continued, "for the consequence of such haste is now upon us. There appear to be insurmountable problems preventing the immediate civilian use of omni-directional ranges on a large scale."

Already the CAA has spent considerable time in practical adaptation of the omni-directional ranges (installed at sites selected without benefit of industry advice and counsel). To date a special subcommittee has met numerous times but has been unable to find answers to the questions posed by the expensive navigational system.

Most vexing of the problems involved, as outlined by Hartranft, are:

1. "Lack of airborne, omni-directional receiving equipment for transport or private aircraft has made necessary a prolonged period during which the omni-directional and four-course ranges must both be operated."

2. "In positioning the omni-directional ranges the above was not considered and omni-directional and four-course ranges criss-cross in a confusing array."

3. "No provisions have been made for right-hand separation when both types of navigational aids are in use."

4. "Off-course" computor hasn't materialized except in paper form.

SILENT AIRPORTS?

Aircraft noise reduction is no longer a theory—an airplane has been developed that is hardly audible at 300 feet.

The National Advisory Committee for Aeronautics equipped a Stinson L-5 with a five-bladed propeller and an engine muffler to prove the effectiveness of methods they had proposed for reducing aircraft noise. The result is a plane they describe as sounding, at 300 feet, like wind blowing through the trees. (See also page 43.)

AOPA officials after witnessing a demonstration at Langley Field, Va., expressed deep interest in the development. They believe that if industry will follow through in the production of the five-blade propeller (and the castered landing gear described in the June issue of AOPA News) many of private aviation's present problems will be answered.

Although engine exhaust is effectively muffled, the new propeller is the major noise-reduction factor. Driven at 1,000 r.p.m., it allows the engine's full power to be absorbed at a greatly reduced tip speed. Noise made by the slow propeller is a gentle "swoshing" sound as compared with the conventional propeller's pulsating roar.

Satisfied with having introduced the "noiseless prop," with the first flight of

AOPA Member E. Robinson plans seaplane trip with Liz Barber, Westport, Conn.

the modified L-5, the scientists already have turned to other experimentation, passing the ball to the manufacturers. Question is, will the industry be able to carry it through?

VOTE FOR AIRWAY LIGHTING

Civilian pilots favor the continuation of airway lighting, CAA Administrator T. P. Wright revealed after a recent survey.

Cooperating with CAA, AOPA forwarded several thousand airway lighting questionnaires to its members. A total of 98.5 per cent cried, "Not so" to the suggestion that radio ranges and electronic navigation aids have made airway beacons obsolete. Many pilots emphasized the advantages of double fixes offered by both radio and lights. Several reported that beacons had saved their lives.

One fact revealed by the survey was that more than 90 per cent of all civilian pilots do some night flying, and about 10 per cent of all civilian flying is at night.

Replying to other questions, 92 per cent of those answering reported that present beacons are adequate for usual night flying conditions, and 59 per cent thought them adequate for moderately bad conditions.

SELLING PRIVATE AVIATION

Operators and instructors must develop pilots who are good salesmen for aviation, according to ALLEN F. EDWARDS, Detroit AOPA Unit chairman, who recently addressed the Michigan State Aeronautics Conference.

Asserting that one buzz job, one accident, one newspaper headline cancels years of private-aviation promotion, Edwards insisted that a favorable attitude must be created by a continuous demonstration of safety and sanity.

Edwards pointed out that commercial operators who give flight instruction and rent planes are in a position to control large groups of pilots. In addition to teaching a student how to operate his aircraft, it should be every instructor's goal to turn out pilots who do not have accidents and who do not cause public complaint against private aviation.

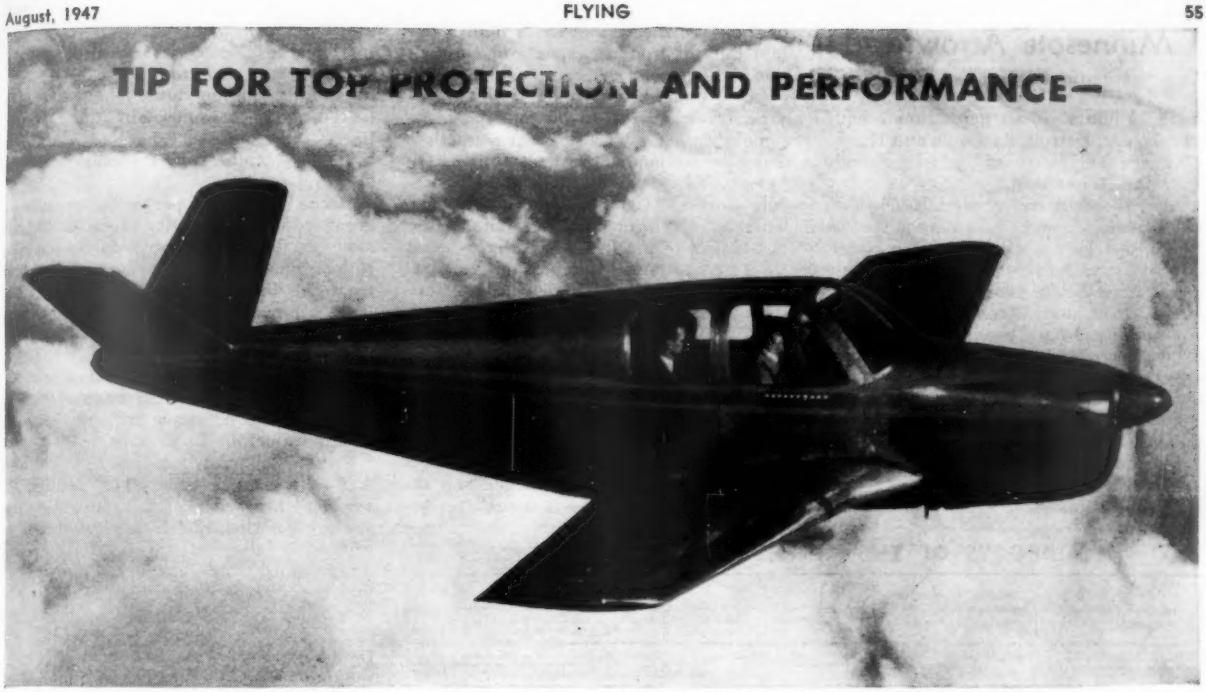
"Too often technique alone is stressed in an effort to meet flight tests, while plain 'good flying sense' is overlooked," said Edwards. "The product is a Government-licensed pilot one day and a Government-catalogued accident the next—not to mention a black eye for us."

PARK LANDINGS FORBIDDEN

In ruling that aircraft may land at only five of our National Parks, the Department of Interior is opposing transportation progress. Lessons learned in handling automobiles (at one time no automobiles were allowed in the parks) already have been forgotten.

Ignoring the most visited U.S. National Parks, the Department has ordered, "No . . . aircraft (shall land) . . . on land or water, on any Federally-owned area within any national park or monument, except for emergency (reasons) . . ." The Department has listed the following exceptions:

(1) Mount McKinley National Park, Alaska, (a) *McKinley Park Station Airport;* (b) *The surface of Wonder Lake;* (2) Death Valley National Monument, Calif., *Death Valley Airport;* (3) Glacier Bay National Monument, Alaska, (a) *Gustavus Point Airport;* (b) *The waters of Bartlett Cove, Sandy Cove and Icy Strait in the vicinity of Gustavus Point Airport;* (4) Jackson Hole National Monument, Wyo., *Jackson Airport;* (5) Boulder Dam Recreation Area, Ariz. and Nev.; (a) *Boulder City Municipal Airport;* (b) *The entire surface of Lake Mead.* END



BEECHCRAFT BONANZA "butterfly" design reduces conventional tail surface drag 1/3—and so increases operating economy.

Beech endorses Socony-Vacuum Aviation Products

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Minnesota Arrowhead

(*Continued from page 29*)

York 10 hours. In an approximate equidistant arc, Detroit, St. Louis and Kansas City are 5½ hours of lightplane flight from the Arrowhead.

Arrowhead history goes back 300 years, when Radisson and Craselliers landed on Lake Superior's west shore and explored the interior. Daniel Greysolon and Sieur DuLhut set out to rescue Father Hennepin in 1680, and Verendrye sought the northwest passage here in the 1740s. For a hundred years after that, Grand Portage at the mouth of the Pigeon River was the first fur market of the northwest.

Even so, the Arrowhead was still a frontier 60 years ago. Men came hunting gold and found iron instead—and great stands of virgin pine. Five billion feet of pine are estimated to have been cut out of the Arrowhead, and more than a billion tons of iron ore have come out of pits so huge they dwarf the Culebra Cut of the Panama Canal.

But the wild forestland and the lakes remain the Arrowhead's great attraction. Superior National Forest, established 40 years ago by President Theodore Roosevelt, covers 3,700,000 acres of streams, lakes and virgin timber. Within the boundaries of the forest is America's last wilderness—the so-called Primitive Area covering more than 1,000,000 acres. Here there will never be any automobile road, resort, summer home or other artificial structure.

In the western Arrowhead is the Chippewa National Forest, with resorts, summer homes, and a forest of 1,313,000 acres. At Walker, near the Chippewa Forest's edge, is the Shingobee Winter Sports Center, with skiing, tobogganing and ski tows. Other winter sports areas are Bemidji and nearby Wilton, where there are five cleared slopes, two ski trails and a ski tow; and Duluth, where there are many hills, skating rinks, toboggan slides and three ski jumps. In the Mesabi Range communities there are highly organized winter sports—even to dogsledding.

Canoe trips and portaging remain a great wilderness activity there. It is possible to follow the same canoe-portage routes that the old voyageurs learned from the Indians. The chain of border lakes are connected by the famed Rainy and Pigeon Rivers—the waters of one reaching Hudson's Bay, the other the Atlantic Ocean via the Great Lakes and St. Lawrence River. The Arrowhead Guide Book contains 15 canoe trips varying in length from four to 35 days.

Fishing lakes where anglers seldom wet a line can be reached by seaplanes. Seasons are closed only during the spawning periods and from now until December or later wall-eyed pike, crappies, bass, panfish and lake or salmon trout may be caught easily. The season for other kinds of trout—steelhead, rainbow, brown and brook—closes September 15. Limits are generous and license fees reasonable. Non-resident fishing license is $3 per person ($4.50 for husband and wife). Non-residents under 16 do not require a license if accompanied by parents or guardians who have licenses.

Non-resident hunting licenses are more expensive than fishing licenses. Small game licenses are $25, deer licenses are $50.25. Non-resident bow hunters can hunt deer for $10.25. Game in Northern Minnesota includes small animals, deer, ruffed grouse, ducks. The Arrowhead is a great nesting area and contains funneling points for Canadian ducks down the Mississippi Flyway.

Public golf courses exist at Aitkin, Bemidji, Cass Lake, Cloquet, Chisholm, Duluth, Ely, Eveleth, Fort William, Gilbert, Grand Marais, Gull Lake, Hibbing, International Falls, Moose Lake, Port Arthur, Pengilly, Two Harbors, Virginia and Walker.

Flying visitors to the Arrowhead can rent automobiles in Duluth and drive along the beautiful Lake Superior International Highway (U.S. Route 61) to Pigeon River at the Canadian border, and on to Port Arthur and Fort William, Ont. It is possible to go on to Nipigon, where the Nipigon River is widely hailed as the finest trout stream in the world. The highway skirts the north shore.

Detailed information about the Arrowhead can be obtained from Hilding W. Silfverston, Executive Secretary, Minnesota Arrowhead Association, Hotel Duluth Building, Duluth, Minn. The Arrowhead Association coordinates the activities of service clubs, chambers of commerce and resort associations within the Arrowhead.

Airports of the Arrowhead, arranged in geographical groups, are as follows:

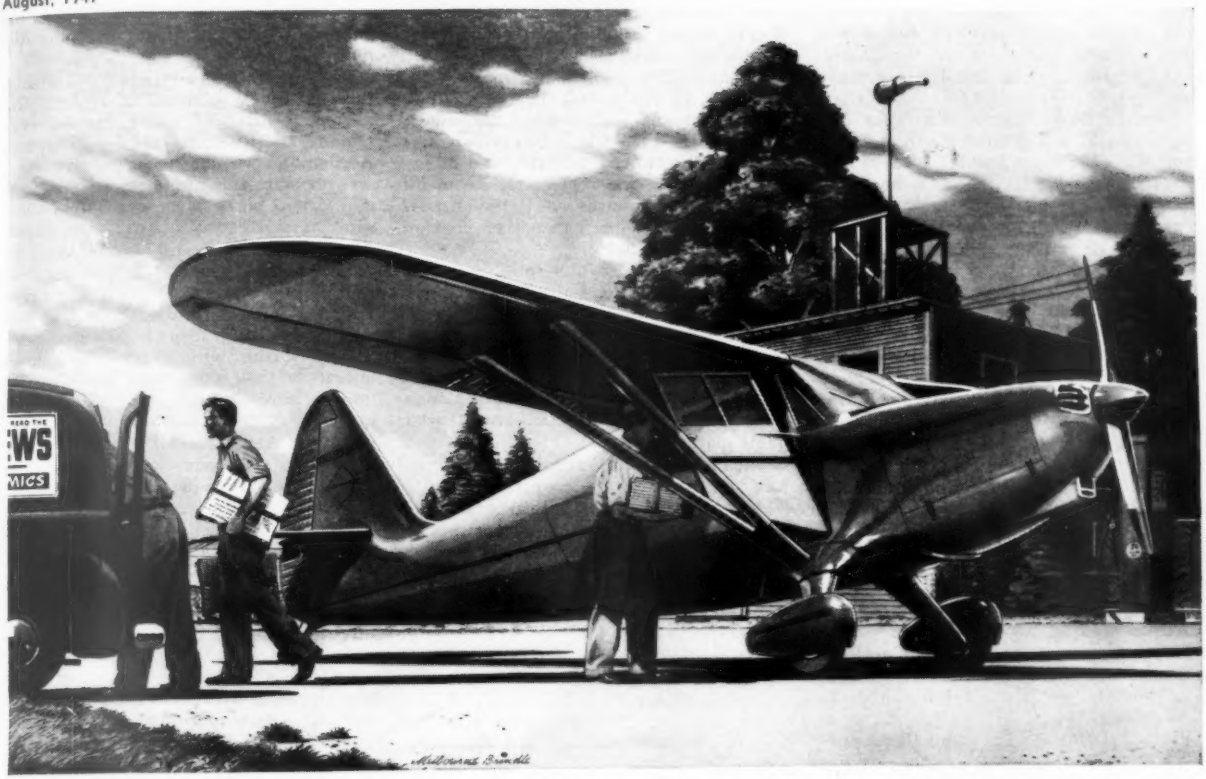
AIRPORTS OF THE MINNESOTA ARROWHEAD

Airport (latitude and longitude)	Phone number	Nearest town and distance	Number of runways	Length of longest runway	Gasoline grades	Service facilities	Seaplane facilities	Season open	Write to
Bemidji Airport (47°28′—94°52′)	75-W	Bemidji (3.8 mi. NW)	3	5,700′	80, 90	mechanic, fuel, repairs	Moberg's Seaplane Anchorage	all-year	Les Flewelling, Secy. Civic & Commerce Assn., Bemidji Harold Dickinson, Chairman, Airport Committee, City Hall, Bemidji
Port-O-Wilds	853F3	Bemidji (9 mi. NE)	2	2,300′	80	A&E mech.	yes	spring, summer, fall	Bemidji Civic & Commerce Assn., Bemidji
Wolf Lake Resort (47°30′—94°52′)	4F12	Bemidji (10½ mi.)	not completed		regular		harbor	May 15-Oct. 30	Gregory Grenel, Rt. 3, Bemidji
Coleraine Airport		Coleraine (.8 mi. SE)		2,500′	80	fuel, minor rep., storage			
Cook Airport (46°52′—92°42.5′)	To be instal.	Cook (3¾ mi. S)	*	*	80, other on order	being installed	Lake Vermilion	May-Sept.	Sidney Krantz, Cook Riley's Lodge, Cook
Crosby Airport	1292	Crosby (1 mi. W)	2	2,900′	80	gas, oil	Serpent Lake	spring, summer, fall	DuWayne E. Mogers, Crosby
Deer River Airport (47°20′—93°48′)	855	Deer River (1 mi.)	2	2,200′	80	gas, oil, tie-down, minor rep.	none	all-year as of July 1	Richard Hogan, Deer R. Jr. Assn. of Commerce, Deer River
Williamson-Johnson (46°50′—92°11′)		Duluth (6½ mi. NW)	3	5,700′	80, 91	major A&E, fuel, storage			Arrowhead Association
Ely Airport (47°45′—91°45′)	None	Ely (1.2 mi. E)	2	2,400′	Handled by gas station	storage, gas	yes	May 15-Sept. 30	Ely Commercial Club, Ely Arrowhead Assn., Duluth
Eveleth Airport**									
Grand Marais Airport		NE of Grand Marais	2	2,100′	All grades				Arrowhead Assn.
Grand Rapids Airport (47°15′—93°30′)	997	Grand Rapids (1½ mi. SE)	3	2,200′	80	fuel, storage	none (10 lakes)	all-year	A. T. Gallagher, Secy. Civic & Commerce Assn., Grand Rapids, Arrowhead Assn., Duluth
Otis Lodge Airport	810F3	Grand Rapids (7.5 mi. SW)	3	3,000′	80	fuel	yes		Otis Lodge, Grand Rapids, Minn.
Hibbing Municipal (47°26′—92°55′)	1250J	Hibbing (4½ mi. SE)	4	4,000′	80, 91	fuel, storage, major rep., A&E	none	all-year	Dan Butchard, Airport Mgr., Hibbing Hubert F. Dear, Bureau of Information Hibbing
International Falls (48°54′—93°23′)	20	Int. Falls (2½ mi.)	2	3,200′	All up to 100	will have by June, '47		all-year	Airport Committee, Chamber of Commerce, Int. Falls, Minn.
Gervais Airport		Tofte (1.2 mi. SE)		2,600′	80	fuel, storage			
Virginia Airport (47°30′—92°33′)	2012	Virginia (1½ mi. SW)	4	3,500′	80, 91	fuel, storage, A&E	Eveleth Lake	all-year	Clyde Semon, Mgr. Virginia Airport Arnold V. Stockey, Chamber of Commerce, Virginia

*Cook Airport was to be ready June 1. Will have two runways, longest to be 2,000 feet.
**Eveleth Airport under construction.

DULUTH AREA

WILLIAMSON-JOHNSON AIRPORT 7½ miles northwest of Duluth is the second largest airport in Minnesota. It has three asphaltic concrete runways 150 feet wide, the



Another example of Stinson utility: *A progressive newspaper publisher uses his Stinson for rapid newspaper deliveries within a radius of 100 miles.*

HERE'S ANOTHER STINSON OWNER WHO SAYS:

"My plane really works for a living!"

WHEN YOU SEE the stunning new *21st Anniversary* Stinson Flying Station Wagon, and fly it, you'll quickly understand why so many enthusiastic owners call it America's most *useful* personal plane!

For *utility is the keynote* in this new 4-place "working" airplane. And, in addition, you get inherent Stinson stability, rugged dependability, and the reassuring knowledge that here is a plane you can operate in and out of small fields with ease.

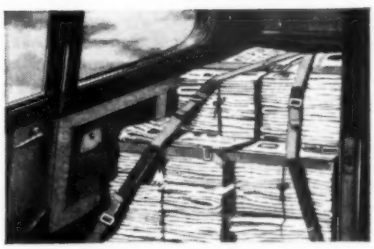
It carries a useful load of 955 lbs. Cruises at 125 m.p.h. Maximum speed, 134 m.p.h. Take-off run, only 590 ft. Rate of climb, 755 ft. per minute. Service ceiling, 15,650 ft. Stops in 290 ft. after landing.

Flaps permit quick take-offs and slow, short landings. Built-in wing slots for safety. Inherently spin-resistant.

Standard equipment includes: two-way radio, dome loud-speaker, starter, soundproofed cabin with controlled ventilation. Hydraulic brakes. Oleo spring-draulic landing gear for smooth, cushioned landings.

Adding to its broad range of utility is the fact that Stinson is also certificated for floats.

FREE—20-page, full-color catalog! See this beautiful new Stinson at your Stinson dealer's, or write for 20-page brochure, beautifully illustrated in full color, to Stinson Division, Consolidated Vultee Aircraft Corporation, Dept. D, Wayne, Mich.



Specially reinforced cargo compartment (24 cu. ft.) with tie-down straps and 2-tone plywood paneling. Side-loading baggage compartment offers an additional 11 cubic feet of carrying space.

Load capacity: Pilot, full gas tanks (40 gallons), and 552 cargo lbs. The two rear seats can be removed for cargo-carrying or installed in 5 minutes to make it a 4-place plane.

Stinson

For 21 years, builder of America's most useful personal planes

longest 5,700 feet. There are full aircraft and engine repair services and public bus and taxis run between the airport and Duluth. Altitude is 1,417 feet above sea level.

RICHARD BONG AIRPORT, across the bay in Wisconsin, is 2½ miles south of Superior. Its NE-SW runway is 3,300 feet long and the NW-SE runway is 3,150 feet long.

Duluth is the anchor of the Arrowhead, a great recreational center with a population just over 100,000. At the head of Lake Superior, average mean temperature in July is only 63.9°. With air virtually free of pollen, Duluth attracts thousands of hay fever sufferers each year and the Hay Fever Club of America has maintained its summer headquarters here for 30 years. The city itself has 66 natural parks and recreational areas. Trout streams actually flow within the city limits. The 30-mile Duluth Skyline Parkway Drive is 700 feet above the lake level. Sinclair Lewis, who makes his home there, refers to Duluth as that "beautiful sea-girt city."

THE IRON RANGES

COLERAINE. The Airman's Guide lists Coleraine as having an airport with a 2,500-foot runway. Eighty octane fuel, storage, and minor repairs are available. The port is less than a mile S-SE of Coleraine.

COOK. Delmar H. Hard, of Cook, provides the following information on the airport there: It is 1¾ miles south of Cook, has two runways, the longest of which is 2,000 feet. There may be a mechanic, and a tank and pump were to be installed at the field this summer. Eighty octane fuel is available and other grades can be ordered. Airplane charter service to lakes in the north and Canada is available from Riley's Lodge, Voss Resort Dock, or on call from any resort or lodge in the vicinity.

DEER RIVER. The airport is one mile from the town of Deer River, and has two sod runways, the longest being 2,200 feet. Eighty octane gas, oil, minor repairs and plane tie-down service are available.

ELY. The airport is one mile southeast of Ely, a city of about 6,000 population on the Vermillion Range. The two runways are gravel-surfaced, and the longest is 2,000 feet. All grades of gasoline can be obtained through arrangement with local private tank trucks.

GRAND RAPIDS. The airport is 1½ miles S-SE of the city. It has three sod runways, the longest of which is 2,200 feet. Eighty octane gasoline and servicing facilities are available here.

HIBBING. The municipal airport is 4½ miles SE of the town. There are four soil cement-surfaced runways, the longest of which is 4,000 feet. Eighty-two and 91 octane gasoline is available and major aircraft and engine repairs can be made here. Taxis and buses run to the airport. There is a municipal hangar and charter services are available.

OTIS LODGE. This widely publicized flying resort is 11 miles southwest of Grand Rapids. There are three excellent turf runways, the longest of which is 3,000 feet. Eighty octane gasoline is available, a mechanic is on call, and taxis are available to town or "anywhere." Otis Lodge is famous throughout the Midwest as a pilots' paradise.

VIRGINIA. The municipal airport has four sod runways, the longest of which is 3,500 feet. Seaplane facilities are on nearby Eveleth Lake. The airport is 1½ miles south of Virginia and has 80 and 91 octane gasoline.

The Iron range communities represent the only concentration of cities in the Arrowhead. Stretching in a long line from Grand Rapids on the southwest to Aurora in the northeast, they include Coleraine, Bovey, Taconite, Cooley, Nashwauk, Hibbing, Chisholm, Buhl, Kinney, Virginia, Eveleth, Gilbert, and Biwabik. Approximately north of the Mesabi Iron Range is Cook near Lake Vermillion. Ely is northwest and contains an underground iron mining industry on the Vermillion Iron Range. In contrast with Ely's iron mining, are the open pit mines such as the Hull-Rust mine at Hibbing which is three miles long, from ½ to one mile wide, goes as deep as 435 feet and contains 55 miles of railroad track. The Iron Range towns are in the heart of the Arrowhead country and there are nearby lakes and streams. Otis Lodge, southwest of Grand Rapids, is on the edge of the range, and Deer River, near the eastern edge of the Chippewa National Forest, is west of the Mesabi Range.

LAKE SUPERIOR NORTH SHORE

TOFTE is a village of 250 population about 80 miles northeast of Duluth on Lake Superior. According to information from the Arrowhead Association, Tofte has a single-runway airport, called Gervais Airport, with a 2,600-foot earth or sod strip. FLYING has not been able to confirm this information with Ray Gervais, owner of the strip, but 80 octane gasoline is listed as available in the Airman's Guide.

GRAND MARAIS is a city of 1,000 population 110 miles northeast of Duluth. No airport is listed as yet in the Airman's Guide but according to the Minnesota Aeronautics Commission, construction was to start this summer on a Federal Aid airport here. Meanwhile, the Minnesota State Highway map lists an airport just northeast of Grand Marais. From the Arrowhead Association comes information that the airport has two gravel strips, with the longest runway 2,100 feet long and having all grades of gasoline.

The North Shore drive which gives access to this wilderness stretches 150 miles from Duluth to Pigeon River and runs on into Canada to Fort William and Port Arthur and beyond as far as Schrieber. The drive crosses 40 streams and it is possible to catch fish in Lake Superior en route. A short distance inland is the untouched wilderness of the great Superior National Forest.

BEMIDJI

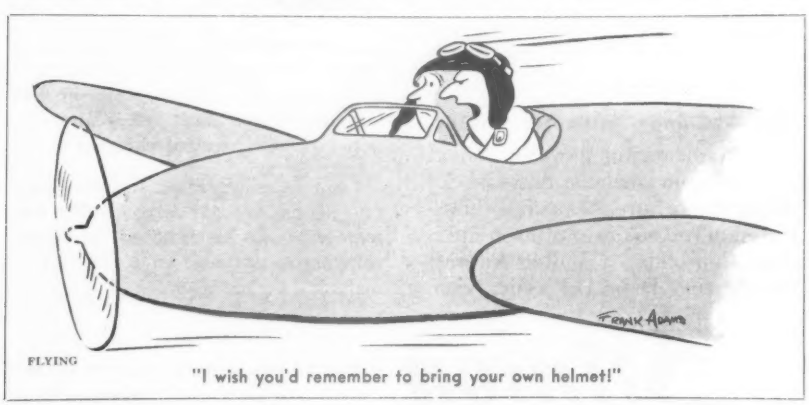
BEMIDJI. The municipal airport here is capable of handling DC-3s. There are three runways, two of them macadam and one packed dirt. The longest runway is 5,700 feet. The airport is about three miles northwest of the city. Eighty and 91 octane gasoline are available. There is A & E mechanic service, and a licensed aircraft inspector is on the field. A charter service is also available here. The airport has a seaplane base—Moberg's Seaplane Anchorage on Lake Bemidji at the foot of 16th Street.

PORT-O-WILDS. The airport is nine miles northeast of Bemidji. It has two 2,300-foot sod runways, plus seaplane facilities. A & E mechanic service is available from Bemidji and 80 octane gasoline is available. The port is open the year-round except when heavy snow is on the runways.

Bemidji is a city of about 10,000 population in the western part of the Arrowhead. Boats and guides are available at many of the scores of resorts in the area. The city itself is on Lake Bemidji, with good fishing even in the city limits. Bemidji is known as the home of Paul Bunyan, and huge statues have been erected to the mythical woodchopper and his huge blue ox Babe. There is an 18-hole golf course at Bemidji. Ten and one-half miles from Bemidji, Wolf Lake Resort is building an airport which was not completed as this article went to press.

RAINY LAKE

INTERNATIONAL FALLS. This border city has a $750,000 airport scheduled to be dedicated this summer. Its two 3,000-foot bituminous runways are located 2½ miles south of the city. Application has been filed to make the airport a port of entry, which would permit Canada-bound pilots to use it. U.S. residents planning to fly into Canada are advised to write the secretary of the chamber of commerce for latest information. Rainy Lake is one of the largest lakes on the border and has 1,600 miles of shoreline. Lake Kabetogama is a famous pike fishing lake 27 miles south of International Falls. The city is the gateway to the Lake of the Woods district in Canada. END



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This aviation landmark is the home of the Brinckerhoff Flying Service, operated by George C. Brinckerhoff. His aviation experience is wide and varied—airport operator . . . flight instructor . . . mercy pilot to frozen-in Tangier Islanders . . . CAA pilot and aircraft maintenance examiner—a part of aviation for over 20 years!

Mr. Brinckerhoff writes: "It just makes good sense to go along with Esso Aviation Products—products of high quality since the days of Kitty Hawk. With them, customer's confidence and satisfaction is assured! For quality, fine performance and dependability, it's Esso all the way."

At the oldest, and at many of the country's newest airports, Esso Aviation Products are winning new friends, and new recognition for quality, dependability and service.

Breaking the World's Speed Record

(*Continued from page 42*)

break the world's speed record by both England and the United States will be made this year (by the time this publication reaches the stands, some already may have been run). Wherever they are made, procedure will be standardized and results adequately authenticated. F.A.I.'s international rules do provide a frame of reference within which can be seen a true picture of airspeed progress since November 1906 when the first world speed record of 25.66 miles an hour was established.

From that time until 1945 development was smooth and uninterrupted. But current speed-record attempts have had increasing significance. On November 7, 1945 G./Capt. H. J. Wilson set a new record of 606 m.p.h. His flights revealed at least two things: the effectiveness of turbojets used for the first time in international record breaking, and he came sufficiently close to the speed of sound to experience the effects of a partial shock stall. From that moment on, we began to appreciate the full significance of the sonic barrier.

It was noticed that changes in the air flow occur when the speed approaches the speed of sound—or, in other words, the speed at which waves propagate themselves in air—and that these changes could lead to a partial or complete shock stall.

Before 1945 the most pressing problem in speed development had been to find enough power. But from 1945 onwards ample power was available to give the thrust needed to push the aircraft as close as its design would permit to the sonic barrier. There, at present, further progress seems temporarily blocked by this problem of the partial or complete shock stall.

An aircraft's behavior at the shock stall is not always predictable. Some machines put their noses down, some put them up. Few remain fully under control. Donaldson, Wilson, Waterton and other English pilots with plenty of shock-stall experience say the effect is that the air has turned into lead shot, the aircraft shakes violently, there is often a roaring sound.

The fact of the matter is that, at present, all world-record work is being done with partially shock-stalled aircraft. And to get through the sonic barrier, so far as can be seen at present, an aircraft must go through a transition phase in which it may be wholly shock-stalled. The shock stall must be conquered in order to give aircraft sonic speed. Everything now depends on an understanding of the relationship between sub-sonic and super-sonic speeds.

In the future, when rocket-driven, man-carrying vehicles of new shapes are driven through the sonic barrier, to travel, like V-2, at enormous heights and speeds, the ratio of current vehicular speed to sound speed may lose importance. But while the fastest man-carrying vehicle still is considerably less than sonic speed, that ratio is the pivot of aviation progress and the world speed record is its supreme test.

In 1946 the *Meteor* which set the record of 616 m.p.h. attained what is termed (in the light of this sonic-speed ratio) a Mach reading of 0.81. Had it achieved a ratio of 1.00 it would have been travelling at the speed of sound which, at the time and place of the record and in the prevailing temperature, was 780 m.p.h.

It is technically more informative to say that the *Meteor* did 0.81 than to say that it did 616 m.p.h., though both are true statements. It is, however, more fundamental that the *Meteor* should be capable of flying at 81 per cent of the speed of sound because that represents its basic speed capability.

At sea level it did a ratio or, to use designer's jargon, a Mach number of 0.81 and 616 m.p.h. At 10,000 feet it would still show a Mach number of 0.81 though it would not be able to do as much as 616 m.p.h. At 20,000 or 30,000 feet, or any height where the thrust was adequate, the Mach number would remain 0.81 whereas the speed would alter.

The aircraft is harnessed to the speed of sound and must fly slower in temperatures where the speed of sound is less and faster in temperatures where the speed of sound is more (see chart on page 42). Donaldson waited (unsuccessfully) for a very hot day because then the speed of sound would have been highest, and, although his Mach number would have remained the same, his speed would have been higher.

The figure 0.81 is not the highest Mach number ever attained, only the highest attained under world-record conditions. A *Spitfire*, for instance, has obtained over 0.90. But that was during a dive and at height and the figure was observed within the aircraft.

It is the great virtue of the rules laid down by the F.A.I. that records are observed from outside the aircraft. The movements of the aircraft during the whole of its record-breaking attempt are under surveillance from the ground or from other aircraft. The movements are recorded by an elaborate battery of instruments, all independent of the aircraft making the attempt.

That is one of the reasons for the much criticized rule that the aircraft must fly close to the ground, at a height never exceeding 75 meters (246 feet) in the three-kilometer (1.86-mile) speed base or the 500-meters (1,650-feet) entry run. At no time during the flight must it exceed a height of 400 meters (1,312 feet).

A digression here,—it's easy to justify the use of metric figures in world-speed records. The F.A.I., which is the only internationally recognized body for setting the rules for record attempts, accepts only the metric system. This is partly because its foundation on October 14, 1905, took place in Paris where representatives of eight countries, the United States, Great Britain, France, Germany, Belgium, Italy, Spain and Switzerland, gathered; but also because scientific workers have played a great part in devising apparatus for world record work and they generally prefer the metric system. Instruments, therefore, have been calibrated in the metric system. If one uses miles, feet and yards, over-precise people object that they are not valid. The world's record, they say, is 991 km/h and not 616 m.p.h. for the F.A.I. takes no responsibility about the conversions from one set of figures to the other.

The speed base, then, is three kilometers long and has a 500-meters entry run at either end. Within that stretch the aircraft must fly level to the satisfaction of observers on the ground, observers who

15 YEARS AGO

FROM the August, 1932, issue of this magazine:

Latest Army pursuit, the Boeing XP-936, was tested at Wright Field. Rated among the fastest pursuit planes in the world, the single-place all-metal plane had a semi-low wing consisting of two parts—a stub integrated with the fuselage, and the wing proper. The plane was powered with a supercharged Pratt & Whitney *Wasp*.

Fokker Works in Holland had developed the D.XVII pursuit. First models were powered with an un-supercharged Curtiss *Conqueror* which attained a speed of 190 m.p.h. Equipped with a Rolls-Royce *Kestrel* engine, the plane's speed could be raised to 208 m.p.h. The Fokker plane was metal except for the wings which were wood covered with plywood. Top wing was constructed in one piece—the lower, two.

Engineers at Sperry Gyroscope Co. had perfected their artificial-horizon instrument for blind flying.

Latest product of the de Havilland factory in England was the *Fox Moth* with room for three, or if necessary four, passengers, besides the pilot. The passengers rode in a roomy cabin below and just forward of the wing's center section while the pilot was in an open cockpit just aft of the cabin. The plane was powered by a 120-h.p. *Gipsy* engine.

A method of directing speech and signals through an invisible beam of ultra-violet light had been developed and tested by John B. Taylor, General Electric Company engineer. He successfully carried on a 15-minute conversation with the ground station while in the dirigible *Los Angeles*, 2,500 feet above Schenectady.

W. G. Cornelius gave a public demonstration of his "free-wing" plane which he claimed could easily fly three hours or longer and land without the pilot touching the controls. Such performance was due to "free-winging—the support of the wings by freely-pivoted supports so that they readjust themselves."

Los Angeles and New York were only 28 hours apart, according to a new schedule inaugurated by United Air Lines.

More Power

lighter weight

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Transmitter-Receiver Combination

IF you've been looking for a better, lighter and less expensive aircraft radio, here it is — a high-performance transmitter-receiver that gives consistent transmission and reception even under adverse atmospheric and skip conditions.

It is the Lear AIRCRAFTER—a product of Lear quality and advanced engineering — a radio that provides VHF transmission on 6 frequencies, and beacon and broadcast reception with loudspeaker operation. The remotely controlled power amplifier unit is dynamotor driven, contains the complete transmitter and the IF and audio sections of the receiver.

So everything you've wanted in private plane radio is here in this Lear achievement. It's compact, easily installed and weighs under 15 pounds complete. More facts are listed in the box. Look them over — then get complete information from your Lear Aircraft Radio Dealer.

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RADIO

OUTSTANDING FEATURES OF THE NEW LEAR AIRCRAFTER

- 6 VHF transmitting frequencies
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- Beacon and broadcast receiver
- Audio output, 5 watts
- Speaker operation
- Simultaneous range filter
- Loop operation on both bands
- Tubes and crystals easily replaced
- Panel space, 4⅞" x 7"

are approved by the F.A.I. and furnished with simple sighting instruments. There is, of course, the check made by the speed cameras which we'll talk about a bit later.

The surveying of the course must reach a high standard of accuracy. In Britain, it is usually done by the military authorities. Steel standards are erected in concrete bases at the ends of the course and are checked daily for verticality while the course is in use.

Observers are sent up in aircraft which patrol the ends of the course at a height of 400 meters. Purpose of these aircraft, which carry recording barographs, is to testify that record flights never exceed the maximum permissible height.

The course must be covered four times in alternate directions. The average of the speeds obtained is taken as the figure for the world record. It will be seen that the rules do everything possible to prevent the aircraft obtaining advantageous aid from the wind or from diving and to ensure that its performance is under continuous supervision by approved observers.

These rules, which have worked remarkably well, have been criticised as highly dangerous. Certainly there is an element of danger in flying at such extreme speeds, close to the ground and partly shock-stalled. Yet a certain risk has always been associated with record breaking and it does not appear to be greater now than in the past.

Consequently the only rule changes the F.A.I. is likely to countenance are an increase in the length of the base from three kilometers to six kilometers (3.72 miles) and a reduction in the number of alternate runs from four to two.

Present rules demand that an aircraft must make a normal take-off and a safe landing. Should the record attempt result in the death of the pilot either at the time of the test run or within 48 hours afterward, no claim can be made. Documents substantiating any new claim must be despatched not later than six days after the event; though a longer period of grace is allowed for the submission of all the supporting evidence, such as timed films and the like.

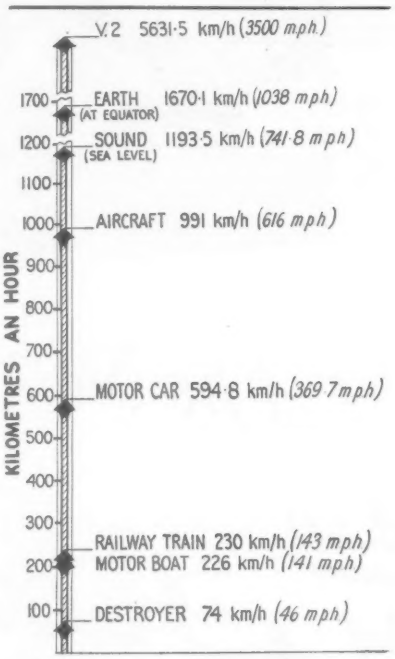
More than 35 countries are now members of the F.A.I. so that its authority has world-wide recognition. Record claims made without its approval are generally regarded as untrustworthy. Proof of the value of the F.A.I. is that its figures for approved records in speed and performance are often so much more sober than the over enthusiastic prior claims of constructors and pilots. To achieve a world record is a big and expensive task, but having achieved one the figures are as nearly unchallengable as they can be.

As history of the world altitude record shows, no set of rules is proof against planned dishonesty; but, forunately, such a thing is rare in aviation.

When Britain decided to attempt setting a new world speed record in 1945, she called in the National Physical Laboratory to organize the timing. Three methods were used: one based on motion picture cameras, another on time-linked still cameras and the third based on radar. Radar timing proved less effective than had been hoped and was not used again in 1946.

The main timing responsibility rests with the movie cameras. They are installed in huts at each end of the three-kilometers base, so aimed that their field includes the vertical timing markers. The cameras can take 250 frames a second though they were set at a slightly lower rate. Shown in each frame, by means of a prism exposure, is a triple timing disc which shows minutes, seconds and hundredths of a second.

The timing disc is driven in step with the vibrations of a tuning fork that is enclosed within a constant-temperature chamber and controlled by land line direct from the National Physical Laboratory's quartz oscillator. The master timing therefore was done by the quartz oscillator.



Record speeds of vehicles are compared here with speed of sound and of the earth.

In these oscillators a small plate is used, the size of which is adjusted to a resonance frequency of 100,000 per second. The plate is cut from the natural crystal of quartz and is maintained at constant temperature by thermostat. The motion-picture cameras therefore provide high-precision evidence of the timed position of aircraft at each end of the course.

This system of timing provides a higher accuracy than is required by the rules. The still camera system, which interlinks still cameras with a tuning-fork timing strip, provides evidence of sufficient accuracy to satisfy the rules if there is a failure in the system we have just outlined.

Similar methods of marking the speed course were used in Britain in 1945 and 1946. The three-kilometer posts were set up on the sea shore (at Herne Bay in 1945 and near Littlehampton in 1946) so that the aircraft would fly over the sea. Buoys were anchored to mark the line of the course and balloons were anchored at the ends of the course to indicate to pilots the limiting height of 75 meters.

Air-sea rescue launches patrolled the course while attempts were in progress. Barograph-equipped *Mosquitoes* were used for the 400-meter observervations at the ends of the course. And *Walrus* and *Sea Otter* amphibians were kept in the air so that they could aid the air-sea rescue launches if necessary.

Each run was marked up on a board set in the field of the movie cameras so that the film gave a complete picture of what was happening; the number of the attempt and whether run A, B, C or D.

Communications between observers and officials were secured by a V.H.F. channel. Four V.H.F R/T pack sets were placed along the course and at the two timing boxes. A land line connected the timing boxes with Flying Control and Headquarters, High Speed Flight, at Tangmere aerodrome.

Special meteorological officers were posted at the aerodrome for the trials, and the forecasting chart was brought up to date every six hours during the whole period of testing.

Best way to appreciate the magnitude of effort required to set an official world speed record is to see the whole business through the eyes of the pilots.

In 1946 the British pilots, Donaldson, Waterton and Duke, spent week after week in constant readiness for the few hours of warm, calm weather that were needed. During this waiting period they learned the course thoroughly on standard *Meteors*. Everything went smoothly, but when they began to let out the selected planes for the record run troubles began. The rudder of one *Meteor* showed a tendency to buckle, the dynamic balance of another went adrift and even the fuselage, on one occasion, showed signs of stress.

When finally the record was made the weather was poor with light rain falling and a temperature of 57°, far below what had been hoped for. But it was then near the end of the English summer and the group had almost given up hope for ideal weather.

Wind at the time of the record flight (September 7) was 10 m.p.h. off shore and the sky was almost completely overcast. Donaldson kept low during the whole of the flight, never going near the 400-meter altitude limit at which the two observation *Mosquitoes* were flying. To all appearances, Donaldson's flying was astonishingly consistent. The routine was precisely the same for each run; the turns out to sea and the base run comprised a level, accurate course.

But appearances were deceptive. It was discovered afterwards that the *Meteor* had sustained bumps that had given a differential of as much as 6 G. Waterton made his runs after Donaldson but his speed was somewhat lower—988 km/h (614 m.p.h.).

Both pilots insisted that the *Meteor* could do better in more favorable weather and one further attempt was made

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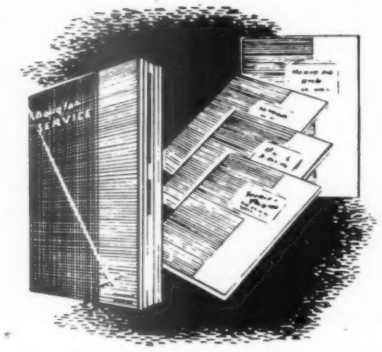

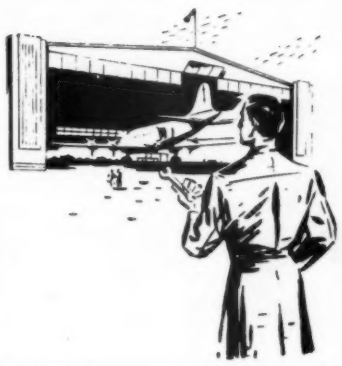

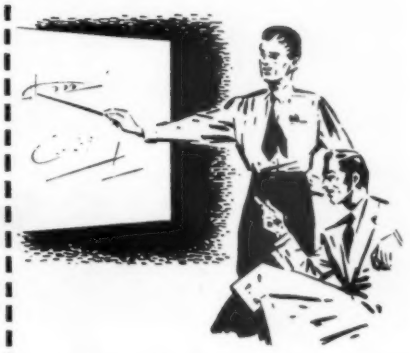

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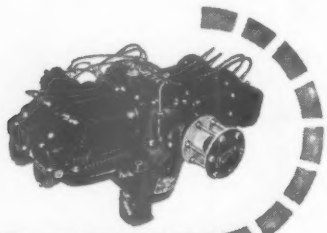

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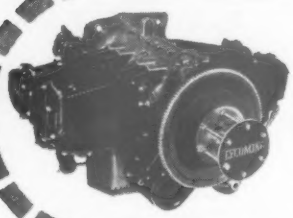

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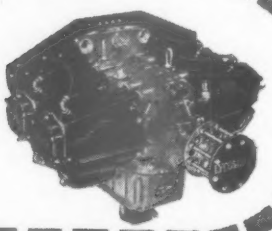
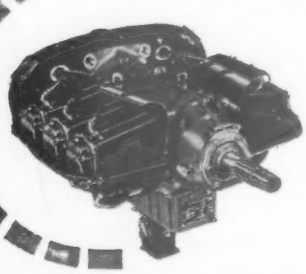


Lycoming Model 0-290-A
Normal Rated 125 BHP



Lycoming Model 0-435-A
Normal Rated 190 BHP

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within six days. The flight, made in the morning and in humid air, was marked by an amazing phenomenon.

The aircraft created clouds (or "halos" as one spectator called them) about themselves as they sped along the course. The clouds were not condensation trails, for they remained with the planes, sometimes completely enveloping them. At such moments it seemed that a small round cloud was rushing along the course.

The air was saturated and the aircraft, as Donaldson expressed it, "squashed" the water out of the air. All three pilots made attempts on the record that morning; Duke's run was disqualified by official observers who reported that he was still on a down grade when in the 500-meter entry run.

None of the runs, however, were better than those on the 7th and the earlier record was submitted to the F.A.I. for approval.

The test was not, from the British point of view, a wholly satisfactory one because although the Mach number of 0.81 was extremely good for a nearly standard aircraft under the difficult record conditions, temperature at the time was so low that the resulting 991 km/h (916 m.p.h.) was disappointing. Something better than 1,000 km/h had been hoped for and would have been obtained had the weather been a few degrees warmer, with the ratio of speed correspondingly higher.

The *Meteor* had as much thrust as it could use from its two Derwent turbojets and it did almost as well as any conventional airplane can be expected to do. It was almost a standard aircraft, chief modification having been made on the windscreen.

Prolonged flying at such high speeds produces sufficient heat from air friction to deform or melt an ordinary plastic windscreen. A reinforced glass screen was provided. Other minor modifications were made, such as the closing of gun apertures.

While such conventional aircraft may not reach a higher Mach number than 0.81 under record conditions, an aircraft with markedly swept-back wings should do so. That was why the de Havilland 108 inspired so much conjecture before the fatal accident to young Geoffrey de Havilland prevented its testing.

With a marked sweep-back a Mach number of at least 0.90 should be attained—which means that in the temperature at which Donaldson set his record a speed of 702 m.p.h. would be recorded.

Great Britain will certainly try to better her own speed record. She has had proof of the value of record breaking and will seek to keep the record as long as she can. But she likewise is happy about the American challenge of the P-80R and the P-84. Friendly competition is at the basis of much technical progress.

EDITOR'S NOTE. As this issue went to press the P-80R, flown by Col. Albert Boyd of Wright Field's Air Materiel Command, had just cracked the record by averaging 623.8 m.p.h. over the official course at Muroc, Calif. The special fighter had been in preparation for several months. Earlier, it tried to break the record, but was unsuccessful. The racer then went back to the Lockheed factory for modifications. With just minor exceptions, the P-80R followed the procedure described in this article.

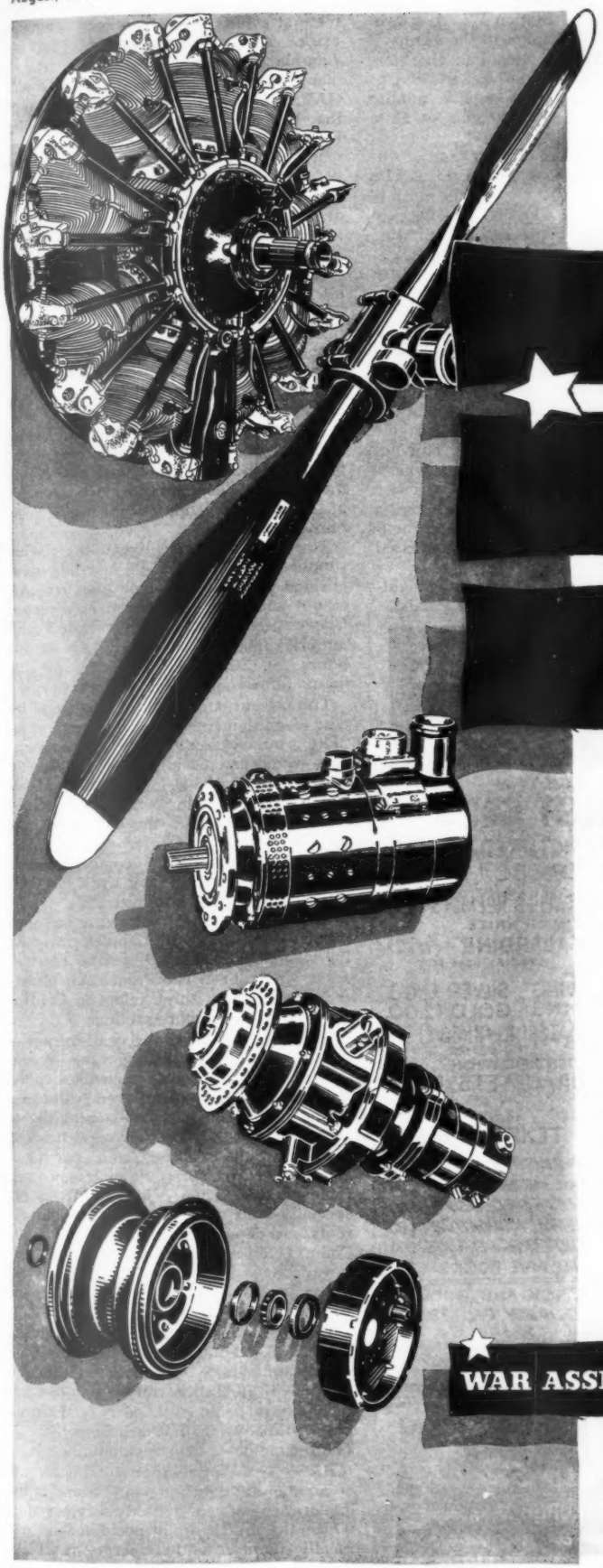
The Helicopter Goes to Work

(*Continued from page* 23)

With a few thousand dollars capital supplied by two Philadelphia businessmen, HAT began operations in May, 1946, with a chartered flight between Bridgeport, Conn., and New York City. Since then it has flown more than 2,000 passengers and expanded its capital to more than half a million dollars. It has flown occasional high-priority freight, a small amount of air mail and has participated in many publicity missions while developing new and permanent helicopter business.

Crop-dusting remains one of the biggest fields of operation so far developed by Helicopter Air Transport. Its new planes will be Bell 47-B3 agricultural helicopters which, along with the present equipment, will be kept busy following the planting seasons around the country.

Crop-dusting by helicopter is the fastest and most efficient method yet found. A downward airflow of 25 m.p.h. allows a more thorough and better directed concentration of chemi-



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cals. The craft's ability to operate in any area reasonably free of obstruction at speeds of 90 m.p.h. down to zero makes it possible to saturate crops with deadly efficiency. HAT's experience shows that a helicopter can dust 150 acres an hour, remaining in flight about 42 minutes each hour and refueling from trucks parked on the farmer's property. Conventional aircraft, forced to operate from the nearest airport and losing time in turns and approaches, usually average only about 17 minutes an hour in actual dusting operations. Helicopter Air Transport has already signed a number of contracts to dust tomato, corn and potato crops and will further utilize its spraying equipment in mosquito and forestry pest control. In the offing, also, is the prospect of employing helicopters for spotting and controlling forest fires.

At present, one of HAT's most profitable assets is the enormous public curiosity for rotor-bladed aircraft. HAT probably could do an extensive barnstorming business. Most of the sightseeing passengers carried by HAT 'copters, however, have been flown only to get maximum operational use of a craft on some special assignment. For instance, when a HAT 'copter flew Radio Station WCAU's farm editor from Philadelphia to the Pennsylvania State Fair at Reading, the time before the return flight was utilized to take curious spectators on five minute flights around the fairgrounds at $3 a passenger.

Cargo-carrying remains the biggest single question mark attached to HAT's operations. The cost of equipment, around $25,000 for the Bell product and $70,000 for the Sikorsky, and limited freight space—240 and 610 pounds, respectively—impose a cargo rate which limits business to occasional high-priority freight. Taking only a meager operational profit, HAT has worked out a chartered flight charge of $125 per hour for Sikorskys and $75 for Bells. So far, its freight contracts have been limited to one-time emergency flights like the recent one when it picked up 20 portable typewriters at Ossining, N. Y., and delivered them to the R. H. Macy department store. HAT is enthusiastically watching the plan of the P-V Engineering Forum to develop a 10-passenger helicopter with a proportionally increased cargo capacity.

Passenger traffic, even excluding sightseers at country fairs, has been far more brisk. At a per-mile rate of 35 cents (double if there is no return traffic) many business executives have found HAT travel economical. Executives of the Weirton Steel Company, Hercules Powder Company, Campbell Soup Company, RCA and a dozen other major corporations are using HAT passenger facilities with increasing regularity. They find it the quickest way to get from the front door of their main offices to the parking lot of an outlying factory.

A group of Philadelphia businessmen, all non-flyers, organized Helicopter Air Transport in May, 1946. One of their first steps was to surround themselves with experienced airlines and helicopter experts. HAT's pilots are all ex-Army helicopter instructors. Frank Cashman, formerly an AAF major at Wright Field, is director of flight training and chief pilot. Norman Edgar, British Army Captain who, in 1919, established one of the first aircraft dealer and service agencies at Bristol, England, is executive vice president.

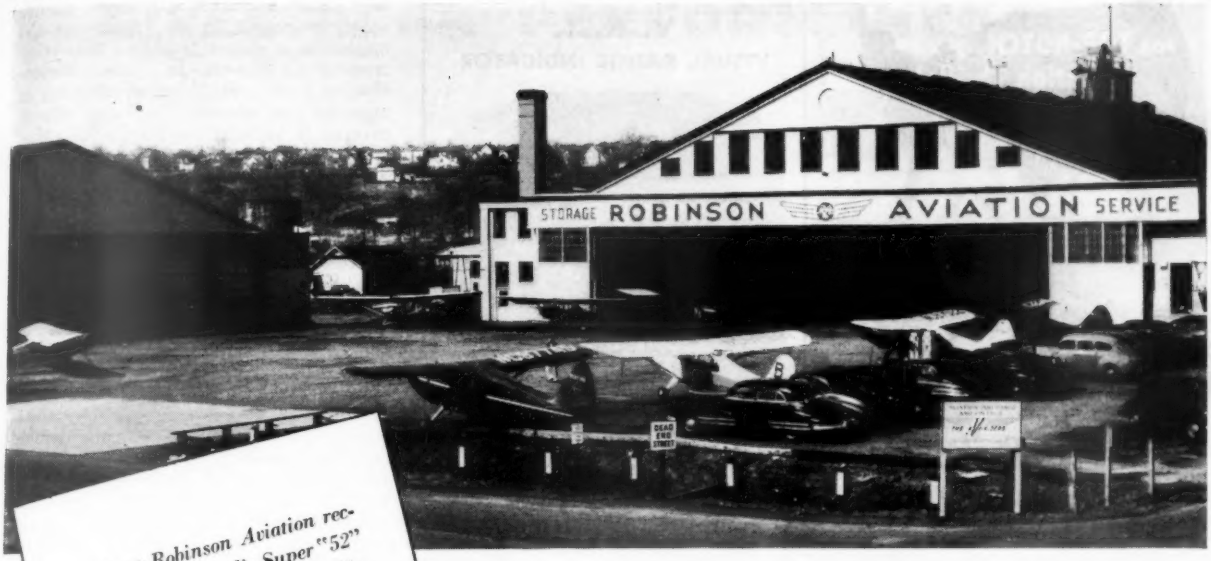
To keep its quickly expanding airline supplied with pilots, HAT last fall inaugurated its own helicopter pilot training school with Frank Cashman as director. Classes are limited to 25 certificated commercial pilots with a minimum of 500 hours for Sikorsky eligibility and 200 hours for the smaller Bell 'copter.

Tuition rates, determined largely by cost of equipment, are $2,000 for a complete ground and air course in the Sikorsky, which can usually be completed in 20 hours; and $1,500 for the Bell, which usually takes about 20 hours of ground instruction and 25 in the air. HAT has also installed a mechanics' school and is the first commercial helicopter training school to be approved by the CAA and by the Veterans' Administration under the GI Bill of Rights. Students for both schools have come to Camden from as far off as California, Minnesota, Florida, and even France. The French Air Ministry recently sent three pilots to Central Airport for helicopter training.

One of HAT's best sources of income—and it may last for a long time—is the awareness of advertising agencies, publicity representatives and even politicians to the news value of a helicopter flight. Last Christmas HAT delivered no less than six Santa Clauses to department stores in New York, New Jersey and Pennsylvania, usually landing them on specially-built platforms on the stores' roofs. A department store in Hartford, Conn., celebrating its 100th anniversary, contracted with HAT to fly packages to the mayors and other officials of 66 nearby towns.

Two New Jersey political candidates, Sen. H. Alexander Smith and gubernatorial candidate Alfred E. Driscoll, chartered a HAT 'copter for a soapbox-to-soapbox campaign of Cape May, Princeton, Wildwood and Clarksboro, N. J. (Both candidates won, incidentally.)

HAT's real contribution to the future of commercial helicopter operations is its exploration of specialized services for which the craft's flying peculiarities are ideally suited. A field of operations which



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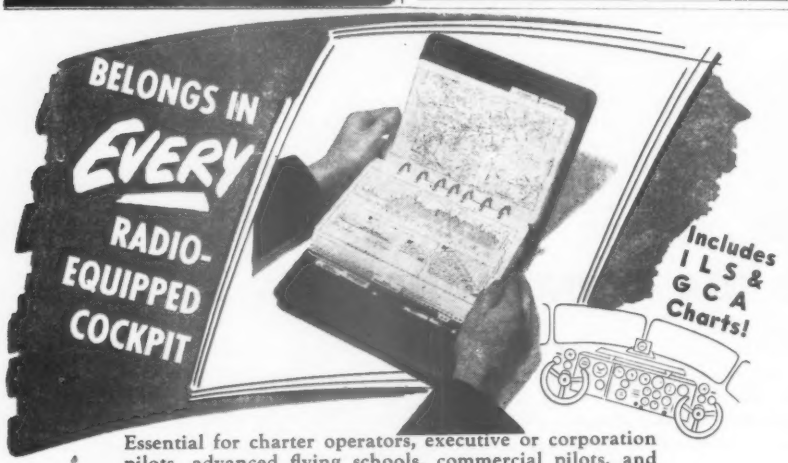

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may keep a lot of helicopters permanently occupied in the future is the inspection of electrical and oil lines criss-crossing the country. In a recent demonstration flight, a HAT 'copter carrying an observer, an electrical utilities official, covered in an hour a section of line that normally would have taken an inspector working a 40-hour week almost two working weeks to check. In one flight covering 200 miles of high tension wire, the inspection was further modernized by the installation of a motion picture camera which recorded every wire flaw or broken conduit along the line.

Aerial photography is another field being exploited to the fullest by HAT. On a recent assignment, a HAT 'copter hovered over the bob-sled run at Lake Placid with a newsreel photographer aboard. The newsreel company which had the foresight to plan the flight got the season's best photo-coverage of the twisting, dangerous downhill run. At several racetracks in the past few months, HAT 'copters have circled the infield to photograph horse races from start to finish.

From the outset, HAT has proposed helicopters only as an adjunct to conventional aircraft, explaining to prospective clients that while the craft is ideal for close-in operation it will by no means replace the airplane. Most people are appalled to learn that the smallest commercial helicopter costs five times as much as the biggest black market automobile. And quite a few people have confused notions about helicopter performance.

Oddly enough few modern building roofs can support a helicopter landing. In most cases it has been necessary to build special rooftop platforms to accept the helicopter's landing weight—around 2,100 pounds. Size isn't a particularly important factor, as HAT recently proved when it landed a helicopter on a 12x12-foot platform during a demonstration at Lake Placid, New York.

Probably HAT's best demonstration of the exact function of the helicopter as a utility airplane was its recent participation in an experiment which may put air mail on a virtual door-to-door basis. In a series of experiments conducted in Los Angeles, Chicago, Philadelphia and New York, helicopters recently flew in and out of nearby small towns and suburbs picking up and delivering tests quantities of air mail.

In the four-day experiment with 15 small towns in New Jersey, on Long Island and Staten Island, HAT was the only active commercial helicopter line participating. (Three manufacturers and Greyhound Bus were the other participants.)

The results were good. Already the Los Angeles postoffice has asked the CAA to authorize the operation of helicopter mail routes on the west coast. It is likely that Chicago and New York will soon follow suit since experiments conducted there were also successful.

In that case, Helicopter Air Transport more than likely will wind up its first year holding a contract to fly the mails by helicopter. END

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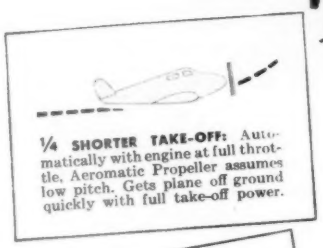
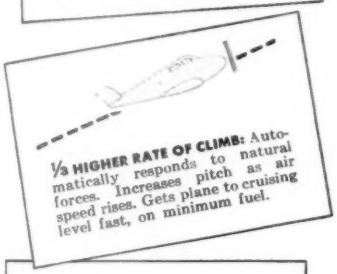
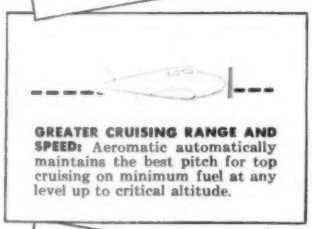


¼ SHORTER TAKE-OFF: Automatically with engine at full throttle, Aeromatic Propeller assumes low pitch. Gets plane off ground quickly with full take-off power.



⅓ HIGHER RATE OF CLIMB: Automatically responds to natural forces. Increases pitch as air speed rises. Gets plane to cruising level fast, on minimum fuel.



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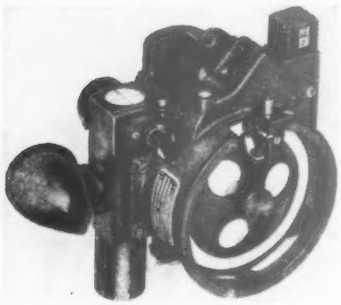

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Cape Cod

(Continued from page 30)

sketching and painting the many boats, wharfs, and narrow streets. In August there is an annual artist's ball, one of the season's highlights. Here, too, are small art galleries and a museum.

Cape Cod is not such a very large place, running about 30 miles eastward out to sea, then another 30 to the north. It is little over 15 miles wide at the most, barely one mile at its narrowest—which accounts for its nickname, "The Narrow Land." An airplane's speed brings Martha's Vineyard and Nantucket Island so close to the Cape itself that they are included here as a part of it.

The terrain is low and gently rolling, with scattered marshes, sand dunes, and moors breaking up the pine and hardwood forests. One thing that puzzles newcomers on first sight is the cranberry bogs. Southeastern Massachusetts is one of the world's largest producers of cranberries and there are hundreds of bogs. They are of all sizes and shapes, crisscrossed with ditches. When there is danger of frost damaging the delicate plants, the bogs are flooded with water from nearby reservoirs. Don't ever try to land on one. The many fine, smooth beaches, however, make good natural landing strips. Be sure to try a few landings on them; local flyers will give you tips on how to do it. Groups of planes often land on the beaches for picnics and swimming.

Cape summers are warm but sea breezes assure comfort. Every so often there will be two or three cool, cloudy days, so an extra sweater will be welcome. Mosquito control is very good here. The winters are windy but generally a little warmer than on the mainland and there is less snow. Airports remain open all year round. Being near the ocean, the whole area is subject to sudden low fogs, especially during muggy spells, but alternate airports are close to each other and well located. Navigation is easy since some part of the coastline is always in view. Overwater flights to the islands are considered perfectly safe; even on the longest hops you are seldom over 10 miles from land.

The Cape country, in fact, is a wonderful place for seaplane or amphibian. There are three regular bases—Marston's Mills, Chatham, and Provincetown, yet virtually every large lake and bay has a sandy beach where one can come ashore. A seaplane is, in fact, as useful as a Jeep here.

Surf casting for striped bass and bluefish is probably the most thrilling sport on the Cape. A sunny day spent at the edge of the pounding surf, with the wind blowing foam and spray into the air, will not be forgotten for a long, long time. The bass are scrappers, running from three or four pounds up to 35 or more. Legal minimum size is 16 inches. Night casting is equally popular, and can be even more thrilling.

Stripers are also caught by trolling from a motorboat cruising just outside the line of breakers. Boats can be chartered at several places for deep sea trips after tuna, swordfish, and marlin. Cost is about $30 to $40 per day, which can be split between several fishermen. Reservations generally have to be made for the

AIRPORTS OF CAPE COD

Airport (latitude and longitude)	Phone numbers	Nearest town and distance	Length of longest runway (ft.)	Gasoline grades	Service facilities	Seaplane facilities	Season open	Write to
Chatham Airport (41°46'-69°57')	Chatham 677	Chatham (1.7 m. W.)	1,560	80-91	minor A&E	yes	all-year	Wilfred J. Berube, Mgr. Chatham Airport. Chatham, Mass. Chatham Chamber of Commerce, Chatham
Edgartown Airport	354-W	Edgartown (2 mi. S)	3,000	80-91		west of airport	all-year	Martha's Vineyard Air Service, Inc., Edgartown Airport, Edgartown Steve Gentle, Airport Mgr., Edgartown Airport, Edgartown
Falmouth (Teaticket) (41°34'-70°35')	Falmouth 517M	Falmouth (2 mi. NE)	2,000	80	fuel, minor repairs	no	all-year	Marvin R. Odom, Airport Mgr., Falmouth Airport, Falmouth
Hyannis Airport (41°40'-70°12')	Hyannis 771	Hyannis (1 mi. N)	4,000	80-91	fuel, storage, minor repairs	no	all-year	Alton Sherman, Mgr., Hyannis Airport, Hyannis Cape Cod Chamber of Commerce, Hyannis
Martha's Vineyard Airport (41°23'-70°36')	Vineyard Haven 1	Edgartown (6 mi. S)	3,800	80-91	A&E, hangar, major repairs	no	all-year	Burnham Litchfield, Mgr., Martha's Vineyard Airport
Nantucket Memorial (41°15'-70°04')	1255M & 971	Nantucket (2.6 mi. SE)	4,000	80-91	fuel, storage, major A&E repairs	harbor	all-year	Jean Cook, Mgr., Nantucket Memorial Airport, Nantucket
Eastham Airport	Orleans 395M-1	Orleans (2 mi. N)	2,000		fuel, storage minor repairs	no	all-year	Walter Myszkowski, Mgr. Eastham Airport
Cape Cod Airport	Osterville 4134	Osterville (3 mi. N)	2,450	80-91	A&E, minor repr.	yes	all-year	J. A. Van Aradale, Mgr. Cape Cod Airport, Osterville Oyster Harbors Club, Osterville
Pilgrim Lake Seaplane*	585	Provincetown (1 mi. NW)	7,000	80	minor repairs, dock, moorings, beach	yes	seaplanes April 1-Nov. 1	Michael S. Diogo, Mgr., Pilgrim Lake Seaplane Base, Provincetown
Country Club Airport (41°46'-70°42')	Wareham 1010	Wareham & Onset (2 mi. E)	2,200	80-90	shop, minor & major repairs	no	all-year	Joseph Messina, Mgr., Country Club Airport, Wareham Cape Cod Hotel, Falmouth

*There is a landing strip north of Provincetown near the Race Point Coast Guard Station which is limited to planes under 3,200 pounds. A new air port is under construction at Provincetown. Completion is expected in September.

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charter boats which supply all necessary tackle. A serviceable surf outfit can be bought at any of the many stores for $15 to $25. No license is needed for salt water fishing. Favorite surf baits are squid, sea worms, eelskins, and certain plugs. The best fishing is from early June to late October. On the islands there are annual "Striper Derbies," in which substantial cash and merchandise prizes are given for the biggest fish in various classes.

The many fresh-water lakes contain black bass, pickerel, trout, salmon, and a few others. The fresh water season is from April 15 to February 15, except for black bass, for which the dates are July 1 to February 15, and for trout, which is in season from April 15 to July 1. Rowboats are usually available for $1 per day. A resident sporting license (for hunting and fishing) costs $3.25. Special non-resident licenses for the period from May 30 through Labor Day cost $1.50, while a year-round permit costs $15.25. A hunting license alone, needed for the fall sports, costs $10.25. Guides are not really needed since Cape Cod is small and well settled, but they are available at moderate prices.

Wild fowl seasons are announced when Federal regulations become known. Information on all aspects of hunting and fishing can be had from the Massachusetts Development Commission, 20 Somerset Street, Boston, Mass.

Swimming and boating are available to suit any taste. Cold, violent surf swimming for the more energetic can be found on the outer beaches, while the coves and inlets offer calm, fairly warm water. Temperature of water in sheltered places is around 75° to 80°, open surf water is from 60° to 70°. Water in the lakes is clear and of agreeable temperature and most lake bottoms are sandy. You can swim by yourself near some lonely stretch of sand dunes or go to any of several fashionable beaches.

Of course, most boating is done in private yachts but small craft can be rented by the hour or day. In the larger towns, such as Hyannis (which has a seaport at one door, an airport at the other) boat liveries are maintained. Ferryboats run from Hyannis and Woods Hole (near Falmouth) out to the Vineyard and Nantucket, and these runs can be a lot of fun. Many airport people have boats of their own or know where they can be had. Bicycles are rented by cycle shops in most towns.

On Cape Cod the towns are small, everybody knows everyone else and this holds true of the airport operators. If there is anything special you want they will know who to ask and where to go for it. Most of the towns have good stores. In fact some of the larger ones, such as Hyannis, boast branches of well-known Boston and New York shops.

There are accommodations to fit every bankroll. A good, comfortable room for the night can be found for as little as $1. Luxurious hotels with charges of up to $50 a day are also here. Many sportsmen drive down from Boston, Providence and other places for surf fishing and spend the night on the beach, sleeping in a blanket roll or sleeping bag. It is prob-

able that the operator of the airport where you stop will know of several tourist homes near his field which he will suggest. Many year-round residents have a few extra rooms which they rent during the summer. The average price is $2 per night, seldom over $5. Weekly rates are from $15 up.

Tourist cabins are everywhere, in every imaginable size and shape. Most are clean, comfortable and well run. Charges are generally between $3 and $5 per night.

Hotels and inns charge from $5 up, American plan. In this matter of room costs, it can only be emphasized that the range of costs is very wide. Clean, attractive rooms can be had cheaply enough for anyone, yet there are also the most luxurious and expensive accommodations. However—and this is most important—Cape Cod is a very popular resort area and rooming facilities are taxed to the limit. If you drop in for the night unexpectedly you'll be taken care of in some way, even if the operator has to make room for you in his own home. It is much better to write, wire, or call ahead and ask that a room be reserved for you, however. When you do so, it will be a very great help to the operator if you will indicate the type and cost of accommodations you desire.

Food costs are quite reasonable and here again there is a wide choice of available eating places. In an average restaurant a seafood dinner will be around $1.50 to $2, a plate dinner about 75 or 85 cents. Several caterers on the Cape will organize and run real Cape clam-bakes, and arrangements can be made with groups or with an airport to hold such a party. A clambake is really something! Clams, corn-on-the-cob, fish cakes, sausage, and spuds are buried in a pile of seaweed which is placed over hot rocks. In a few hours everything will be thoroughly steamed and the crowd pitches in. After a few plates of juicy clams dipped in butter, the meal is topped off with watermelon. Better plan to stay overnight on this sort of outing, though. Rough air won't help a fellow who has just downed one of these meals!

Prices on the islands are generally a bit higher for everything due to the cost of shipping things out on the ferryboats. There are no landing fees at the airports. Tiedowns are fifty cents to $1 nightly. Hangar space is not too plentiful right now but averages $15 to $20 monthly. Aviation gasoline sells for from 28 to 30 cents per gallon for 80 octane. Massachusetts taxes all gasoline but nonhighway users are entitled to a refund. If you plan to do a lot of flying here, ask an airport manager about details.

For information on all general matters, write to the following places and ask for catalogs:

Cape Cod Chamber of Commerce, Hyannis, Mass. (Also ask for their Cape Map.)

Board of Selectmen, Oak Bluffs, Martha's Vineyard, Mass.

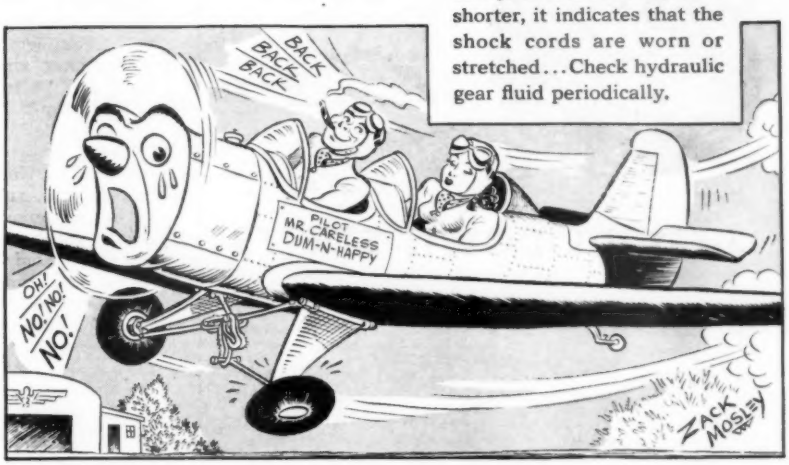
Information Bureau, Nantucket, Massachusetts.

If you plan to stay for a while, a good guidebook will add much to the interest and satisfaction of your visit. For ex-

Things to watch

IN MAINTAINING A PLANE

Check your landing gear regularly. If one shock strut is shorter, it indicates that the shock cords are worn or stretched... Check hydraulic gear fluid periodically.



Things to watch

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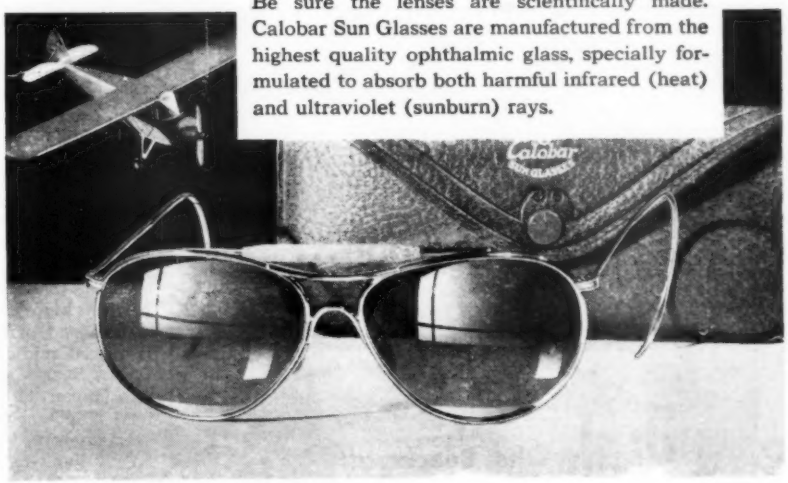

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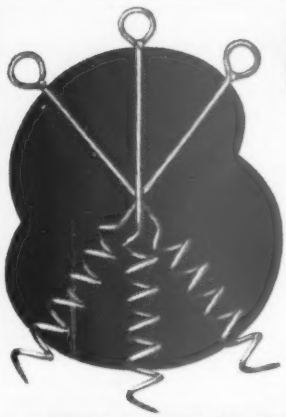

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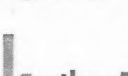

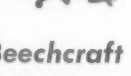

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ample, "The Narrow Land" by Reynard, or "A Pilgrim Returns to Cape Cod" by Edward Rowe Snow, are good.

There is a large airport near the Army's Camp Edwards, north of Falmouth. Navy planes are operating here and it is closed to civilian traffic. Keep away from the camp area. Also, the Navy maintains a bombing range on No Man's Land island south of the Vineyard. At present it is closed to civilian traffic.

WAREHAM airport is five miles west of the Buzzards Bay end of the Cape Cod Canal, on Route 28. It has two sod runways, the longest 2,200 feet. Minor and major repairs are available. Eighty octane gas is on hand. There is a restaurant on the field. Taxi service.

TEATICKET airport also on Route 28, is five miles east of Falmouth. A tee hangar has a yellow roof, there is a single sod runway 2,200 feet long. Service and 80 octane gasoline are available.

CAPE COD airport is unmistakably identified by a large white windmill beside the hangar. It is an all-way sod field. During the summer, runway strips are mowed in the grass. Eighty octane gas, minor repairs, and private car and taxi transportation are furnished. There is a seaplane dock on Mystic Lake, 200 yards from the hangar. This lake has a 5,000 foot stretch. The longest runway is 2,450 feet.

HYANNIS Municipal airport is right outside the town, has three macadam runways, the longest 4,100 feet. Night lighting. Eighty and 91 octane gas and a repair shop are available. The field is used by airliners from Boston and New York. Taxis are on call. Two hangars.

CHATHAM airport is 1½ miles from town, has a high-arched hangar. Sand and sod runways are all-way, the longest stretch being 1,800 feet. White Pond, ¼ mile SE of airport, is available for seaplanes. A dolly is on hand to carry seaplanes up to the hangar. Eighty and 91 octane and minor repairs are provided. A private car handles transportation to town. Facilities for changing planes to floats or back to wheels.

EASTHAM airport is also on Route 28, has an 1,800 foot sod field, 80 octane gas, minor repairs. A taxi is on call. It is between the highway and the Bay, two miles N-NW of town.

PROVINCETOWN airport is a sandy landing strip about 1,800 feet long on the wastelands north of town. It has 80 octane and minor service. There are seaplane facilities on the waterfront of the town. On Pilgrim Lake in No. Truro, a few miles SE of Provincetown there is a new seaplane base. It has a 5,000-foot stretch, 80 octane gas, can make minor repairs, and offers taxi service.

MARTHA'S VINEYARD airport is almost in the island's center, has three 3,800-foot macadam runways, lighting. There is 80 and 91 octane fuel, major servicing. This field is regularly used by airliners from Boston and Hyannis, has a large hangar.

EDGARTOWN airport is next to the ocean on the south shore of Martha's Vineyard. A red-roofed hangar identifies it. There is a level, sod all-way field, 3,000 feet maximum. A tiedown area on the beach side is provided for fishing and bathing parties. Eighty and 91 octane and minor repairs are available. A taxi and private cars handle transportation to town. This is a good surf casting location.

OAK BLUFFS airport has a sod, all-way field, 2,000 feet. There is a hangar, 80 octane gas, minor repairs. Taxi to town. This field is closest to towns on north shore.

NANTUCKET MEMORIAL airport has two 4,000-foot macadam strips, hangars, lighting. There is a restaurant, cycle shop, good repair facilities, airline service to Boston and New York. Taxi. Seaplanes can land in the harbor on the north side of the island. This is the only field on the island. Eighty and 91 octane gas. END

What Power for Lightplanes?

(*Continued from page* 37)

and maintain. The gas turbine appears to be a close competitor in weight and fuel-consumption characteristics. Both seem to warrant further study and research as applied to the lightplane field.

Though all evidence suggests that our present reciprocating engines will be with us for some time to come, they are not without competitors. Whether these competitors will develop rapidly into rivals is a moot question, for research is extremely costly. But it must be undertaken if jets are ever to power lightplanes. END

Mr. Piper Counts the Score

(*Continued from page* 18)

Build 10,000, and the next airport completed increases the choice of destinations to box-car figures for all ports involved.

If the past 20 years have taught us nothing else, they have taught us this need in lightplane aviation, and it's about time we did something about it.

It is also high time we quit kidding ourselves and our public. The airplane has three weaknesses from a utility standpoint. Average Americans measure the utility of a vehicle by the number of steps it saves them. The airplane's utility should be measured otherwise. It is not a pedestrian machine, it is a long-distance machine. Another thing, until average Americans can be educated to use it for long-distance purposes, the airplane's utility is further circumscribed. There is no point in selling it as a useful vehicle when it takes a man to some place he doesn't want to go because of lack of fields.

The airplane's usefulness is further reduced because it is a fair weather, daylight vehicle. In another 20 years it may not be, but I think it the better part of wisdom to go ahead on the assumption that it will. Then all improvements can be declared sales bonuses and in the meantime there will be no disappointed manufacturers and disillusioned customers.

Improved services should, like improved planes, be taken for granted. History of aviation in the past 20 years points the trend in the next 20, for despite all the healthy beefing in the flying world, both services and planes have improved. There is hardly an established airport in the country whose front office does not boast before-and-after pictures proving this statement. If there are not enough hangars to go around today, at least there are more than there were 20 years ago. If services are still sometimes too casual, or inadequate, they are certainly far ahead of what they used to be.

But they must continue to improve if we are to get the most out of our future markets, and improvement is imperative if we expect those markets to increase. A concerted good-will program, deeply rooted at every fixed base, is the only answer. Otherwise, instead of winning more customers we are likely to lose many we now have.

It might be assumed from all this that I'm so pessimistic about the future of lightplanes that I may quit in disgust any day now.

Nothing could be farther from my thoughts or the thoughts of everyone else at Piper Aircraft Corporation. If anything, we are more optimistic than we have been for a decade.

We believe that there are excellent prospects now and for at least the next two decades for improving airplanes and for selling them in large numbers. For example, we sold nearly 8,000 in 1946. We expect to build half again as many more this year. We expect to do an in-

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creasing business in three- to four-place planes, but anticipate a continued steady demand for two-placers.

We expect to increase our buying public by cleaner, higher-performance designs, by simplified instrument boards rather than additional complicated safety devices, by better radios, better engines, metal as well as fabric covering—bigger and better airplanes, steadily improving in performance and safety.

We expect to find more and more buyers in the sportsman-recreation field. We do *not* expect to find them among younger people. Generally speaking, they cannot afford a plane or, if they have the price, prefer to spend the money on a house, a car, or some other equipment more useful to them than today's airplane. If they fly, they'll do it on a rental basis. We expect to find our best customers among older people, who have already paid off on the house, own a car, and have the time and leisure to enjoy flying.

We expect to sell airplanes on the basis that they are not only fun, but get you more for your money than even an automobile. Planes today have a lower first-cost-per-mile value than cars. At 40,000 to 50,000 miles the average automobile is traded in. Nobody knows the life span of elephants or airplanes and we should capitalize on this in our sales talks whenever possible.

Airplanes are safer than ever before, and will become more so.

All maintenance costs will go down steadily, including hangar rentals, gasoline, and insurance. This will make for easier selling to more people.

More and more people are flying annually—to more and more places. You can go farther and see more than in any other vehicle, for less per mile. Flying also is a major sport—more stimulating, more flexible, more fun than any other form of locomotion.

On this foundation, we can build a lightplane industry. I don't predict that it will be gigantic, but it certainly will be healthy. END

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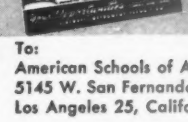

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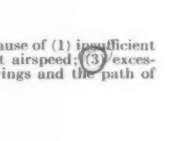
1. When an altimeter is properly set, the needle on the dial will show the approximate altitude above (1) sea level; (2) the adjacent terrain; (3) the landing field?

2. Rotating beacons along the airways are equipped with colored lights to indicate the presence or absence of nearby landing facilities. A rotating beacon with an amber light indicates (1) a nearby field with night lighting facilities; (2) a nearby field without night lighting facilities; (3) no nearby landing field?

3. An airplane stalls because of (1) insufficient power; (2) insufficient airspeed; (3) excessive angle between the wings and the path of flight?



4. Thrust is the pulling force which moves the airplane forward. Drag is the air resistance which retards the forward motion. When the airplane is cruising at 100 m.p.h. (1) thrust is greater than drag; (2) thrust and drag are equal; (3) thrust is less than drag?

5. In order to execute a steady climb, an airplane must have (1) more power; (2) greater lift; (3) more power and greater lift?

6. When an airplane lands on a runway headed due east, with the surface wind reported as northeast, the wind will tend to turn the plane (1) to the right; (2) to the left; (3) whichever way it was headed upon contact?

7. When an airplane is in flight the air passing over and under the wing creates the necessary lifting force. The proportion each contributes in level flight is approximately (1) 50 per cent under wing 20 per cent, over wing 80 per cent; (2) under wing 20 per cent, over wing 80 per cent; (3) under wing 80 per cent, over wing 20 per cent?

8. The carburetor of an engine may ice up when the outside air temperature is as high as (1) 32° F; (2) 50° F; (3) 80° F?

9. If you bail out of your plane at 2,000 feet with a common 24-foot parachute, you will hit the ground at approximately (1) 5 m.p.h.; 12 m.p.h.; (3) 25 m.p.h.?

10. If an airliner is not equipped with oxygen apparatus or a pressurized cabin, the highest altitude at which it may fly from New York to Miami, Fla., is (1) 10,000 feet; (2) 12,000 feet; (3) 15,000 feet?

ANSWERS ON PAGE 90

10 Commandments for Safe Flying

(*Continued from page 34*)

doing well; so, when you make up a check-off list, be sure the points on it are in logical order. Don't get into the habit of jumping helter-skelter over the instrument panel.

Most airline pilots—they're still the best in the world, for my money—start in the center where the throttle is placed, then go clockwise around the cockpit. Do that several times and you'll find you've memorized your cockpit check-off in a definite and logical sequence. In fact, that's my No. 2 rule—*check carefully and logically.*

And before we get this double-checked plane into the air, there is another word that should be said about checking. Good and careful and old pilots (the only way to become old is to be good and careful) make a cockpit check before the engine is started. Then they make another after the run-up at the end of the runway—the last thing they do before take-off. They seem to think that's one way to make sure a take-off will continue as planned.

Now we come to admonishment that is applicable only to those who fly one of these modern planes with retractable landing gear. Don't go away—even if you're not flying that kind of airplane these days, you may be soon. It's inevitable, those who fly usually want to fly farther and farther from home base. And somewhere along the way they begin to want an airplane with more speed and endurance. That desire makes for increasing sales of retractable landing gear type aircraft.

You've probably seen the fellow who has just acquired one of these "hotter" planes and fancies that it makes him a hotter pilot. He'll take off a retractable-gear plane, for instance, in somewhat the following manner: As soon as he thinks he is airborne, he lifts those wheels, holds down the nose of his airplane, picks up speed, and zooms off the end of the runway —all for the benefit of the admiring "customers."

There was one I saw who retracted gear so quickly that the plane's belly scraped the runway. In the resulting fire he would have been a hotter pilot than he thought had he stayed around. Fortunately he got away—but that fire cost the taxpayers a $100,000 military plane.

All that is by way of introducing my No. 3 rule: *Never bring up your wheels until you are certain you can no longer land on the runway if your motor quits.*

There's more about retractable gear that applies when a plane so equipped is brought in for a landing. Since the Navy first developed a plane with wheels that fold into its belly, pilots have been forgetting to lower those wheels when coming in to land. Next to forgetting one's trousers when he dons white tie and tails, there is no sillier feeling than to land a plane with its wheels still tucked snugly in flying position.

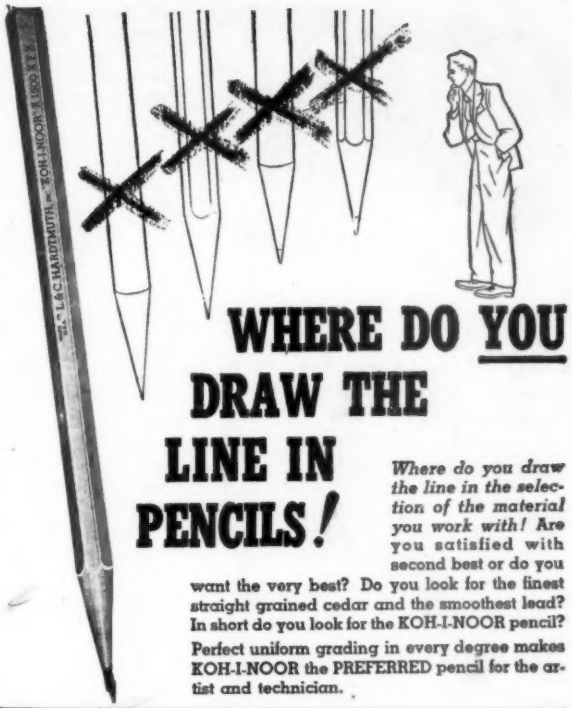
All kinds of devices have been dreamed up to keep pilots from forgetting the landing gear. Some planes have horns that blow when the throttle is retracted beyond a certain point. But even that doesn't always restrain the lads. An even better idea is the plane that has a throttle that won't come back to idling position unless the wheels are down and locked. But I've seen one or two characters wrestle their airplanes onto the runway doing twice the normal landing speed—all the time fighting to get that safety-locked throttle back!

Using a check-off list just before landing, just as it was used before take-off, takes care of the whole business. It might be well to have a definite place in the landing circle at which to think of wheels. The downwind leg probably is the best place. *Cockpit check for landing* (including gear check) with the *downwind leg of the landing circle*—that's my No. 4 rule.

Once, some years ago, I was chugging toward Los Angeles in a small airplane. Below, where it had scarred the desert in a crash landing just short of Palm Springs airport, was an airplane which was distinctly familiar.

It turned out to be a once beautiful four-place job which a prominent man had bought and shown to some of us a week before. The accident occurred during the first cross-country flight its owner had taken. A simple mistake he made on that hop cost him many thousands of dollars—lucky; it might have cost his life.

The airplane, one of the fastest and best equipped in its class, had multiple gas tanks. These tanks provided a craft which had an endurance of several hours. But they also imposed



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on the pilot the responsibility of remembering to switch from tank to tank before one ran dry. That's a simple thing to remember. Yet it was forgetting to flip that switch that destroyed this four-place plane.

Any airplane which has more than one gas tank should also have a two-way radio. I mention such apparently dissimilar gadgets for a reason which will be clear presently. Multiple gas tanks do infer cross-country flights. And cross-country flights, in my opinion, make a two-way radio an absolute necessity for all pilots.

Now for the admonition. Rule No. 5 is *develop the habit of associating your gas check with a radio call.* Some place in the control zone of the airport on which you intend to land, you'll make a call on your radio for landing instructions. If you make it a habit, you'll soon find that each time you pick up the microphone to make a call, if it's only a report to a station underway, it's perfectly natural to look at the fuel-selector valve and fuel gauge. Both of these bear constant watching. Anything which helps you keep looking at them also helps keep you out of trouble.

Another word about gas tanks—Rule No. 6. *Never let a tank run dry.* At the minimum, leave a couple of gallons in each tank. In this way you'll avoid an air lock in the fuel line which could make your engine quit cold. You'll also provide a margin of safety in case you misjudge the amount of gas in the tank you expect to use when landing. It's been done.

There are other things to remember in making a cross-country flight. For illustration: Some years ago I made a hurried take-off from a small field in the Midwest to get away, I thought, from an approaching rain storm. Instead I ran into it about 25 miles farther on, so turned back rather than poke my nose into something worse. In a rush to land before the rain struck I neglected to look at the windsock—the field had no radio or signal lights.

I came barreling down the groove on final approach at what seemed to be several hundred miles per hour. It was apparent the airplane would never stop flying at that speed so I pulled up for a look-see. Imagine my surprise to find the wind had done a complete about face in the space of 20 minutes. That's a common occurrence during the passage of a frontal condition and bears constant watching. Make it a rule—No. 7. *Always check wind direction.*

And that's sufficient basis from which to point out that boneyards are full of airplanes put there by pilots who were too proud to go around from a poor approach. Arguments to the contrary, I'll maintain that 60 per cent of a landing is in the approach. If you louse up your approach don't be stiff-necked and make it worse. Go on around until you are satisfied you are in the groove. If you had a landing signal officer, such as is posted on the after part of a carrier's flight deck, you'd be made to go around if your approach wasn't right. *Be your own LSO*—that's No. 8.

Rule No. 9. *Keep your head and your heading!* Another personal experience shows best what I mean.

Without radio and with only the bare essentials for instruments, I set out from the factory in eastern Ohio to ferry a new lightplane to the coast. First stop was to be at a point diagonally across the state.

About an hour from take-off I glanced out the side and saw a landmark which I was sure was north of my course. At that stage of my flying experience I was a fellow who trusted his senses. So I calmly turned 90° to the south—surely in that way I would pick up a familiar landmark.

But it was only a matter of minutes until I was in country which looked completely unlike anything shown on my map. In spite of constant circling of towns I could find none with signs which would tell me where I was. It's quite apparent that I was lost—so completely lost I couldn't find even an airport. The entire countryside seemed diabolically laid out to entrap me.

Yes, I eventually discovered where I was—but only after I had bi-sected the entire state of Ohio, then turned back to the northwest and landed in a corn field with my engine sputtering from the last drops of fuel in the tank. You see, it was a farmer, a kindly soul, who finally told me where I was. He even chuckled when he told me Middletown airport was only two miles farther on. I was denied even the comfort of having the engine die near a nice level landing field.

Still, I wasn't hurt, my nice new airplane wasn't scratched, I was soon on my way with some tractor gas in the tank—and I had learned a good lesson. Since then there have been many times when the country below looked unfamiliar. But I've never deviated from the compass course I'd set in advance. Sure enough, I've eventually come to a familiar spot which told me where I was. *Keep your heading*—that's No. 9, and it holds especially true when you're confused.

My final rule was derived from the same experience. I got lost because I turned off my course. I *stayed lost* because the sectional maps I had provided went only to my destination, not below it. As soon as I flew out of my map I had no chance to reorient myself. Now, whenever I go cross-country, I'm sure my maps cover a goodly portion of real estate on both sides of my course. A good rule (No. 10) is *carry maps that cover 50 miles to each side of your course*—and 100 miles wouldn't hurt.

Suppose, just to keep the record straight, we go through the list again. Here, then, are my 10 commandments for those who would enjoy the greatest possible flying safety.

1. Use a check-off list, in even the simplest cockpit.

2. Make your cockpit check-off logically, carefully.

3. Never raise your wheels until sure you cannot land on the runway if the motor quits.

4. Associate cockpit check-off for land-

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ing (including lowered gear) with downwind leg of the landing circle.

5. Associate a gas check with every radio call.

6. Never let a tank run dry.

7. Keep a constant check on wind direction—there can be a 180° shift in fronts.

8. Be your own LSO; don't be too proud to go around if you make a bad approach.

9. Keep your head and your heading.

10. Carry maps that cover at least 50 miles each side of your course.

A number of years ago a certain airplane was advertised as the first completely fool-proof aircraft. To prove that point some incautious soul landed one of the first models downwind, deliberately. He succeeded only in wrapping up the unfortunate airplane so completely that major repairs were necessary before it could again be termed fool-proof.

Commenting on that exhibition, someone declared that the airplane had everything but a patented judgment eliminator.

Keeping your wits about you and your memory in good working order will prove this the most useful of flying gadgets for you every time you go up. END

Be Your Own Test Pilot

(*Continued from page 51*)

power and a gas load of only a few gallons, such as would be found on the termination of a cross country flight. Then stall it solo with no power and a full gas load and note any difference. Now stall it solo with intermediate power and full power and note. Then run the same tests with a full load of passengers and baggage and get these figures.

If your ship has flaps do the same thing at different flap settings. If the gear retracts, stall it with gear and flaps, just gear alone and flaps alone. The figures you obtain will give you a basic foundation of what the minimum performance airspeeds are under certain conditions. Under each of these tests stall the ship several times and take an average reading. Of course it is understood that these figures are indicated airspeed and not true airspeed because we didn't consider temperature and pressure. However, for all practical purposes, when your indicator says "stall approaching," believe it regardless of atmospheric conditions.

Another interesting experiment is a check on the rate of climb. If your plane is equipped with a rate of climb it can be readily checked by timing it against the altimeter. Be sure to hold your rate of climb constant. Without a rate of climb you can obtain the same information by using your altimeter and a watch. Simply climb for a thousand feet and time accurately. This will give you feet per minute. Do this at different airspeeds and you will soon learn the best climbing airspeed. Do this both solo and fully loaded and get both speeds. This is not necessarily the maximum climb, which is with full throttle. The maximum climb is not always the best climb because powerplants overheat at some speeds.

Some valuable information can also be obtained on descent by holding a constant airspeed with different throttle settings. This may be either r.p.m. or manifold pressure settings depending on the type of airplane you have. By timing your descent with your altimeter you will find out how fast a rate of descent these throttle settings give. A hypothetical case would be, to obtain 500 feet per minute rate of descent, simply set throttle at 1400 r.p.m., obtain 70 m.p.h. by using your elevators, trim the ship and sit back and relax. I guarantee you that you will be a more competent pilot when you complete this little experiment. It is also nice to know the absolute and service ceiling on your airplane so climb it up (100 ft. per min.) and find out.

Other important information can be found in the form of take-off distances over 50-foot obstacles, and landing distances. In an emergency this information might be invaluable. Make the tests both solo and fully loaded and keep a record of the wind velocity and the temperature. Naturally, the greater the wind velocity the shorter the take-off and landing distance. Also, the colder the day, the more lift with resulting lesser distances.

Try to get as many different conditions as possible and measure off the distances. This is one way of finding out that stall take-offs will give you a loss in performance. The results will open your eyes and your mind. With these performance figures you will really know what your plane can do.

Practically all pilots at some time have forgotten to check their trim tabs before take-off. Some were able to handle the situation gracefully and others, not so fortunate, ended with dire results. To give you an idea just how much airplane you can handle if out of trim, go and find out for yourself. At altitude with cruising throttle trim the ship slowly both to the full nose heavy position and then to the full tail heavy position and see if you can maintain level flight. To give you an idea of what a take-off is like when you forget the trim tab, place the airplane in a glide and with full tail heavy trim, apply full throttle. You will have a lot more respect for the trim tab and not be so apt to forget it on your next cockpit check. You will notice that the airplane can be controlled easier when throttled back slightly in the extreme positions.

Also check the airplane for level hands-off flight. If the craft is wing-heavy and tends to turn one way or the other, check the wing fuel tanks for uneven fuel quantity. If this condition doesn't exist the wings have been thrown out of line A slight correction can be made by glueing string to the trailing edge of the underside of the aileron on the heavy wing. This acts like a small flap and helps to raise the wing. For large corrections see your mechanic . . . and don't drop them in so hard next time.

A few engine tests for lightplanes are as follows:

Check the operation of the carburetor

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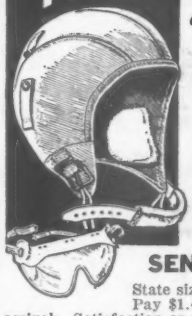

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in unusual positions, such as at the top of a wingover. . . .

A steep turn, with its centrifugal force, keeps the operation of the gas flow normal but take away that centrifugal force and sometimes sediment in the float chamber will cause sputtering. Simply work your throttle back and forth and observe if the engine responds smoothly.

A check on the idling speeds in both a glide and in power off stalls is important. This is a further check on the correct idling speed. Do these checks both with and without carburetor heat. Carburetor heat will naturally cut down the r.p.m.'s.

Check the wide open throttle r.p.m.'s in the air as well as on the take-off run. Too great a discrepancy should be looked into. While checking the wide open throttle position in the air look for any vibration from a prop out of balance or a rough running engine.

Before coming in for a landing it's a good idea to check the magnetos for loss of r.p.m.'s and the correct function of each magneto. A loss of not more than 100 r.p.m.'s is allowable. Of course they are still checked before take-off.

Another important consideration, and one of the most important, is the fuel consumption. It is remarkable that so few pilots do this with their airplanes yet do it constantly with their automobiles. We know that the specific fuel consumption of a powerplant is the weight of fuel consumed per hour (six pounds per gallon) divided by the horsepower. On that next cross country or extra long flight just fill it up to the brim and fly until it's almost empty. Then get the fuel consumption per hour. You can then easily obtain your specific fuel consumption. This is also a check against your fuel-air ratio or flowmeter. If you don't have these instruments, it will be a check against the specifications. At any rate you will have an excellent idea how long you can stay aloft without any guess work. This test should be at cruising throttle only.

Acrobatics, long climbs and other maneuvers such as take-offs and landings will change this figure quite noticeably and will have to be eliminated for any accurate computations. The result is not necessarily the maximum range figure for the airplane but only what fuel is consumed under average flight conditions.

Oil consumption should also be checked and, if excessive, should be reported to your mechanic. Normal oil consumption is roughly 20-1 to gasoline consumed. Another method to calculate it is: oil consumed is .02 pounds of oil per h.p. per hour. (Oil weighs seven and a half pounds per gallon.) Example: 65 h.p. x .02 lbs. equals 1.3 lbs. of oil, or not quite a quart, every hour. Any higher consumption than this should be investigated.

Now don't expect to run through these tests all in one day. It will take a lot of hard work but it will also be a lot of fun. Here is an opportunity for each of you to be a test pilot on your own plane and have a lot of fun at the same time. Let's roll the plane out of the hangar and go upstairs to find out what makes the old girl tick. END

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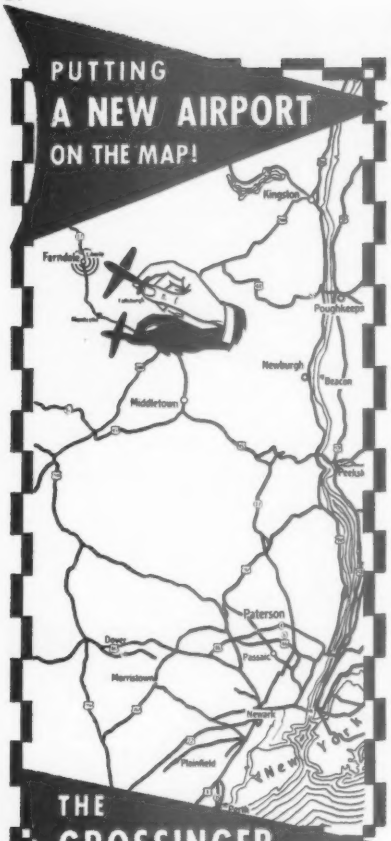

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The Thorp Sky Skooter

(*Continued from page 45*)

peller, which will slow down the engine somewhat at cruising.

The *Sky Skooter* is not a two-control airplane, despite rumors. It has conventional rudder pedals, although the rudder itself is rather small and is not used at all in flight except for cross-wind landings. The ship is so stable you can actually make it a regular practice to keep your feet flat on the floor throughout a cross-country flight. During landings, however, the rudder can be useful in cross-winds and for making gentle slips.

THORP SKY SKOOTER
Approved Type Certificate No. 791

One 65-h.p. air-cooled Lycoming engine	
Wing span	25 feet
Length	17 feet
Height	7 ft. 7 in.
Gross weight	1,050 pounds
Empty weight	565 pounds
Wing loading	10 lbs./sq. ft.
Fuel capacity	18 gallons
Baggage (full seats)	20 pounds
Top speed (sea level)	114 m.p.h.
Cruising speed (75% h.p.)	100 m.p.h.
Stalling speed	47 m.p.h.
Range fully loaded	400 miles
Service ceiling	10,000 feet
Rate of climb	650 f.p.m.

Source: Thorp Aircraft Co., Van Nuys, Calif.

The flap is extremely simple. It is just a spring-loaded panel with a push-button handle between the two seats in the cockpit. There are two positions: the 15° for take-off or in strong winds, and 30° for normal landings. With the full flap I found it almost impossible to miss a good landing. The angle of approach is extremely steep; any pilot who's not accustomed to such effective flaps is sure to be gun shy during his first landings. But once he gets used to them, he'll never have anything else.

The *Sky Skooter's* flap gives it such a steep glide you can safely get over almost any obstruction surrounding an airport. You simply fly up to the field until you know you've passed over the obstruction, then shove the nose down and literally dive down to the runway. It sounds scary, but the "dive" actually is very slow. Near the ground you flare out easily, and let the plane settle onto its back wheels.

Thorp has worked some interesting features into the *Skooter*. One is the all-movable horizontal tail surface. There is no stabilizer; when you move the stick back and forth the whole horizontal tail surface moves. Thorp and his engineers think this type of elevator will be widely used before long. They say it cuts down considerably on weight, size and cost. Also, they claim it's much more stable. So far as I am concerned it's surely effective and easy to operate.

Another novel feature is the externally-ribbed or "beaded" wing. Those are the ridges running around the wing. Because this structure was developed, Thorp is sure he can make wings a lot more cheaply than can the manufacturers of conventional metal wings.

The 18-gallon fuel tank is in the rear of the bubble hatch, just behind the two seats. The hatch itself opens out sideways, door fashion. The cockpit is just about as simple as it can be made and still have the basic stuff required by CAA. Beside the flap handle there is a much smaller handle that operates the brakes simultaneously on the two main wheels. You just pull that handle to apply brake; to park, you pull the handle back, then push a button on top which engages a catch.

If he can ever get into the minimum production he's hoping for, Thorp says the *Sky Skooter* should sell for "less than $2,500." Of course, it's a long way from having a nice-flying little prototype to producing airplanes in a factory. But if John Thorp does find the facilities and backing he needs, the *Sky Skooter* should make about as nice a simple little runabout as a pilot would want.

MAX KARANT

Sell Them Like Autos

(*Continued from page 46*)

The best I could get out of any salesman (and I asked four of them this question) was cost of operation per flying hour, but I could not even get this broken down.

This conversation was typical:

"How much does this plane cost per mile to operate?" I asked.

"We don't figure planes by the mile but by the hour," the salesman said. "This one costs $7 an hour to operate."

"What is the cruising speed per hour?" I asked.

"Around 100 miles per hour."

"Well," I asked, "does this $7 an hour include depreciation and overhaul and inspections, for instance?"

This brought on some double talk and I couldn't get at the facts. The salesmen I talked with did not seem to have the answers to these questions.

One said, "We haven't got some of those things completely figured out yet."

I was particularly interested in two planes. One was a rather sleek four-place job.

I sought a salesman and asked a few questions about it.

"It's a fine, roomy, comfortable plane," he said. "Just go up there and take a look for yourself."

So I stood in line with a few others, walked up the little gangway to the platform next to the cockpit, and peered in. When I came down, the salesman, who had not taken the trouble to go up there with me, didn't even try to approach me again.

In several other instances the salesman did not even take the trouble to suggest that I look into the plane.

And in no instance did a salesman:

1. Suggest a demonstration.
2. Try to get my name.
3. Ask me if I had ever flown in a plane.
4. Suggest that I get into the plane on display and look it over thoroughly.

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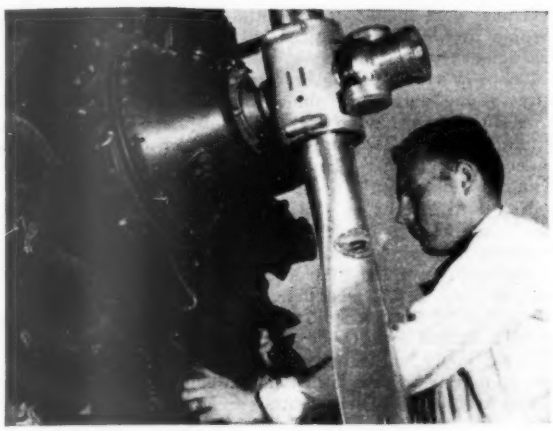

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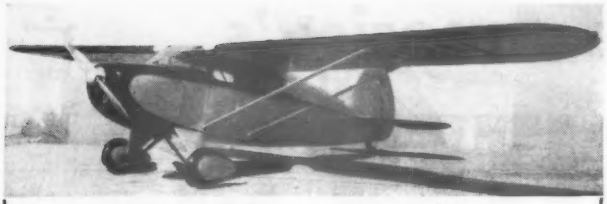

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Its 2,000 graduates, former students, their wives and families are invited to attend the reunion—the first ever held by the College.

August 1st and 2nd have been set aside as anniversary observance days and August 1st through 7th, Homecoming Week. Program includes a buffet dance, dinner speeches by Lt. Gen. James "Jimmie" Doolittle and other aviation leaders, and other activities to renew acquaintances.

Write today for detailed information and hotel reservations.

Parks Alumni Association
PARKS COLLEGE OF AERONAUTICAL TECHNOLOGY
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5. Walk me around the plane and point out salient features.
6. Emphasize how easy it is to fly and to own a small plane.
7. Offer to give me a booklet or a catalog.
8. Bring out a large folder, or have a chart or wall picture available which would explain further details.
9. Volunteer the names of other owners of the plane.
10. *Or even ask me if I was interested, now or in the future, in buying a plane!*

Of course, it was the last day of the show. Maybe the boys were tired. Or, perhaps their sales sights were such that they had taken so many orders it was just a bore to dig up more new prospects.

The lack of salesmanship was also evident in the exhibits. Outside of a few pictures of planes in flight or on the ground, and a motor or two on stands, there were no cut-away cockpits or some version of one which would make it easy for the salesmen to get people into the front seat to "see for themselves how it feels to get behind the stick or the wheel."

There were no pictures of other owners, or lists of famous people or well-known business concerns who might own a particular type of plane.

There were no charts or diagrams—at least, I did not see any—giving details on plane construction or operation.

And there were none of the kind of photos or exhibits which stimulate emulation, adventure, convenience, the pleasures or economy of small plane travel and ownership—none of the things which make a prospect want to buy.

Not until I went up to the second floor and saw a sign at the booth of a flying school did I realize that I could obtain flight instruction without cost.

This sign revealed that according to the GI bill of rights I was entitled to free instruction. I asked the attendant if this applied to officers. He did not know, but at least he took the trouble to find out.

It did apply, and much to my surprise I found that I could get up to $3,000 worth of instruction paid for by my Uncle Sam. I just wonder how many other ex-officers and enlisted men who were at that aviation show, and had been thinking about owning, or even renting a small plane, knew that it would cost them nothing to learn to fly.

The reason I am sure that my own experience at the show was typical was because I observed a man, well-known in New York business life, who was also getting the same treatment, or lack of it, as I.

This man, a millionaire, now owns a $6,000 private plane and is probably a good prospect for another.

He was there with a well-dressed woman. I followed them around a while. They, too, were looking, asking some questions here and there. No salesman voluntarily approached them; none seemed to follow up after the questions.

I couldn't help but compare the Aviation Show at Grand Central Palace with the many automobile shows I have attended at the same place.

Now I know that the automobile business has more money, more facilities, more of everything than the small plane industry. But they haven't got a corner on showmanship or salesmanship. Both of these have made the motor car business a multi-billion dollar industry.

At an automobile show the salesman, if you even indicate the slightest bit of interest, will ask you to get behind the wheel. He will get your wife into the back seat. See how comfortable it is. Observe the materials. How smart. How well made. Dependable, economical. Easy to operate; comfortable.

If he hasn't got a cutaway motor or a flossy exhibit of his car's engine or other mechanical parts, he'll raise the hood, point out various features.

Then, perhaps, he will open a booklet, turn the pages . . . show you various other gadgets or models.

Invariably the automobile salesman will ask you what you are driving and if you are interested in buying a new car. And if he detects even a spark of interest, or can generate that spark himself, he will quickly give you his card, and ask for yours. He will then invite you to a demonstration, and shortly later you would get a call from him, and the next thing you know you are riding in the car and driving it. Perhaps he loans you one for a day. Shortly after he has you on the dotted line. Of course it has happened to you. The aviation salesmen evidently forget it has also happened to them.

Furthermore, at no automobile show are booklets ever

left piled on the seats, as at the aviation show. They are available but the salesman makes it a point to give you one, and engages you in conversation. They even do that at the flower show.

The motor car salesman knows his business. If he is selling a commercial car he can show you all sorts of charts on upkeep costs. He is quick on the trigger to tell you the names of users. He'll sell you economy, pride of ownership, everything in the book. He knows all the answers.

And that is what has sold America more than 30,000,000 motor cars.

No wonder that some of the small plane makers are cutting back on previous production estimates.

No wonder the small plane market is still relatively small.

One thing the small plane manufacturers perhaps haven't learned yet is that the more mass selling by *all* makers, the more planes each maker sells. For example, if I had been invited to two or three demonstrations and if one or two salesmen had kept after me, they would certainly have made me very small-plane conscious. One day I might end up by buying one. Perhaps the man who gave me the first, or even the man who took me on the second demonstration might not be the one who would sell me.

I might select another plane for one reason or another, but the mass effort would have sold me on the idea of owning a personal plane.

Get a man in a mood to buy a new car and he'll buy somebody's new car. The same thing goes for planes.

One of those salesmen could have interested me in learning to fly and revealed to me that I could do so without cost. If he had been a smart salesman he would have volunteered to give me all of the information, or get it for me. In that way, he would have gotten my name. He would have sent, or brought, the information to me and I would have been obliged to him. At least he would have established the contact. Those salesmen just didn't seem to be that smart.

I venture to say that until they get that smart the personal plane business isn't really going to be big business. And until they start locating and creating prospects by personal contact, as well as good advertising, and really do a selling job, the production lines of the small plane plants will never reach anywhere near the volume necessary to get the prices down to a point where more people can afford to buy. And most people will never be able to afford to buy a small plane until smart salesmen convince them of it. END

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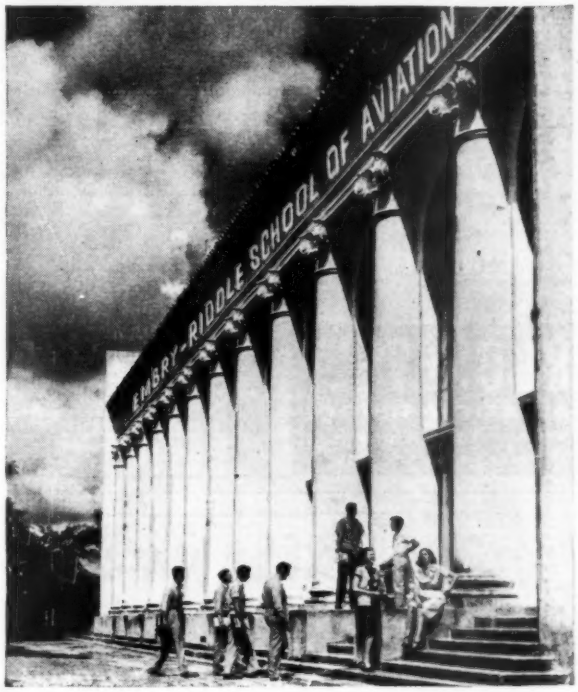

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Letters

(*Continued from page 6*)

lots are irrelevant; they are expected to operate at long distances from their weather bases, often over hostile territory. Even so, I noticed during the war that no pilot could clear from a military field until he had talked to the meteorologist and had his clearance approved.

"Although I originally conceived the G-A-R map prior to the war (while with Cessna), the idea is so obvious that it is immaterial to me who gets credit for it; the important thing is that these maps should be set up on a nation-wide basis, or at least at a selected few weather stations for service testing. I'll rest my case on the reactions of the private pilot group . . ."

PRENTISS CLEAVES

Los Angeles, Calif.

20 Years of FLYING

(*Continued from page 33*)

In 1927 plane manufacturers were thinking seriously of giving up the mass-production of personal aircraft to specialize on luxury-type and transport planes, and harried airline organizers were running about with merger in their eyes. But the orators insisted that aviation already was a full-fledged industry, its growing pains all past—that soon everybody would either be flying or doing things in "the air age." Aviation stocks did increase in popularity on Wall Street. To guard and guide the infant industry, to insure beginner competency and safe standards for equipment and maintenance, the Government appointed a small number of inspectors who doubled as aviation missionaries. But the employment boom in aviation never materialized. Today Uncle Sam's aviation employees still are relatively few in number:

	Aeronautical Inspectors	Air Carrier Inspectors	Airways Employees	Total U.S. Civil Air Workers
1927	30	None	80	——
1946	153	70	9,013	12,997

It was in 1927 that they bundled a passenger into a fur-lined flying suit at Cincinnati, put a parachute on him, stuffed him into the front seat of a *Whirlwind* Waco, piled several sacks of mail on and around him, and flew him to Chicago in dead of winter. Air transport innovations were getting ready to fly even braver travelers over the Alleghenies to Columbus and put them on a train for the night trip to Albuquerque, where they got on another plane and flew to the West Coast. They took on chicken sandwiches and hot coffee from a Memphis boarding house when planes got there near noon. Some pilots began to wear uniforms, others objected.

But even when comparing that day of mad experimentation with present-day streamlined and precision flying, 1927 air travel was pretty safe at that:

	Passengers Carried	Revenue Miles Flown	Airline Personnel Employed	Passenger Fatalities
1927	8,661	5,779,863	1,200	1
1947*	12,600,000	309,580,439	65,500	115

*Estimated

END

The Square Deal House

(*Continued from page 27*)

engine instrument department Robinson can repair anything except Sperry gyroscopes and gyro horizons.

While minor repairs are made on propellers, major repairs are done by Pester at Roosevelt Field, where one of the best prop repair units is located.

"Flat rating should bring us the 85 per cent shop efficiency we want as an ideal goal and it should prove financially beneficial to the customer in the long run, bringing him more service for less cost," Franz explains. "We believe, although we can't as yet prove it, that flat rates can stand up against the time-plus-materials method of billing any day in the week."

Robinson executives point out that many lightplane owners have purchased beyond their means. To such folks, any repair cost seems excessive. If they are slipshod about minor repairs for their automobiles nothing very serious can happen to them. Not so with an airplane. The owner just can't pull over to the side of a cloud and park.

One Robinson employee recently had his 1941 Buick engine overhauled for $200. The engine was not removed from the car. It is interesting to note that an Aeronca *Chief's* engine overhaul costs $150 plus $25 for removal from the airplane. The Buick has been produced in far greater quantities, too, than the Aeronca.

In an automobile, water is put in the battery "for free." But in an airplane it sometimes takes a mechanic 50 minutes to remove the cowling, remove the battery box cover, remove the safety wires, put in the water, and then replace the wires, the cover, and the cowl. A fair price would be $3.50 for the time consumed but Robinson charges a flat $1.

"Thus, while we allow in general for the worst possible conditions, we charge for the average, making money on some and losing on other operations," Franz added.

Or as C. S. Robinson, president of the company, put it:

"We want to make airplane ownership a pleasant and easy undertaking. Through the establishment of a combined service under one roof, continually improved policies and flat rate schedules, we believe we are working toward this end.

"Only as ownership is supported by proper service can private aircraft become a utility and have something desirable to offer the lightplane owner." END

Report from Washington

(*Continued from page 43*)

back with their arms folded, their feet on the floor. Suddenly, at about 800 feet, the autopilot sharply swung the control wheel hard left, then hard right, then hard left again. My hair stood straight up, I'm positive. The pilot reached halfway, then sat back when the plane resumed normal glide. I gulped a couple of times then asked what had happened. 'Oh,' said the pilot, 'that was just a truck or something passing in front of the transmitter.'" The remainder of what our observer said was so hot it would burn this sort of paper. But it's really no hotter than what CAA said in reply. They wanted our correspondent, before going completely off his nut, to realize that he was flying *automatic* landing, something that's still in a highly experimental stage. Automatic, as distinguished from instrument landings are what T. P. Wright says is the ultimate answer—but not for some years to come. . . . We simply report these things to keep the record straight. . . .

Swivel Crisis

The third gadget is the swivel landing gear. Like we said last month, there is more to the development in this field by CAA than first meets the eye—CAA was the first to discover this. Fearful of effects of swivels on the airport program budget (planes with castered gear need only one runway), CAA Administrator T. P. Wright recently announced a new airport-swivel policy. It says in effect that while the swivel is a swell idea (check!—it was Administrator T. P. Wright who put it over), so far as CAA is concerned it will have no influence on the current airport budget, which is good till next July, and

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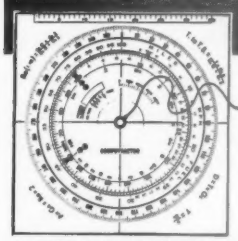

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to be "concentrated on the larger fields." Mr. Wright adds: "We plan to give full-out consideration to the effects of the cross-wind landing gear in connection with our (fiscal) 1949 program"—beginning next summer. But while this is CAA policy, the administrator is willing to make exceptions. "I am having an additional study made," he says, "to determine whether there are any individual instances where it would be in the public interest and in the general interest of civil aviation to modify present plans, because of the possible general adoption of the cross-wind landing gear within a sufficient length of time to warrant such action."

ReCAPitulation

Some of the war-time leaders of the Civil Air Patrol who attended its national convention in Washington recently must have done a double-take when showered with praises by everybody from General of the Air Forces Carl Spaatz down. The laurels contrasted with the treatment many of the CAP personnel received during the war when—poor relatives of the AAF that they were—the CAPs got little help from headquarters and still less credit for their heroic work. Now, they are assured, all is different. (Among other things, they represent votes and AAF needs votes in the Congress—for funds.) CAP is a great little outfit and nothing is too good for them. We hope it's true. And we hope also that Brig. Gen. F. H. Smith, Jr., new CAP commanding general, gets better breaks from GH than formerly was the case. CAP is still potentially one of the outstanding lightplane organizations in the nation, just as during the war it was the outstanding one in the world. END

Answers to Do You Know? on Page 76

1. (1).
2. (2). Green indicates a lighted landing field and red indicates no landing field.
3. (3).
4. (2). In steady flight, thrust and drag are exactly equal. If thrust becomes greater than drag, the airplane will accelerate; if drag becomes greater, it will slow up.
5. (1). Except in turns and during change in flight direction, the lift equals the weight of the airplane. An automobile climbing a hill at a uniform velocity does not need additional lift because its weight has not increased. It does, however, need more power. So also with an airplane. It is no heavier when climbing than when flying level. No increase in lift is required—merely an increase in power.
6. (1). An airplane on the ground tends to weathercock, or head into the wind like a wind vane.
7. (2). Most of the lift is supplied by the low pressure area or "suction" created by the air passing over the upper surface.
8. (3). Vaporization of gasoline in the carburetor may reduce temperature as much as 50°. If the air entering the carburetor is very moist, icing will occur unless carburetor heat is applied.
9. (2). The rate of descent is about 1,000 feet per minute.
10. (1). Civil Air Regulations prohibit a cruising altitude higher than 10,000 feet, though for not exceeding 30 minutes it may fly as high as 12,000 feet.

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Farmers' Air Center

(*Continued from page* 38)

and cement blocks and range in length from 160 feet to nearly 400. When glass and other now scarce materials are provided, the smallest of these hangars, which now contains the airport office, will be partially converted into a showroom. Other accommodations underway include a series of T-hangars for transient farmers. A maximum of 40 is contemplated now but more may be added.

Rates for visiting pilots run from 50 cents to one dollar per night, and from $10 to $15 a month. The airport averages about five transients each weekday and about 12 each on Saturdays and Sundays. Less than half stay overnight. Those who do come from all over the state and from Nevada.

The operators of University Airport are excessively proud of their fueling facilities, which they designed. These consist of a circular station around which five planes can be parked and fueled simultaneously. Gasoline, oil, water, and lubrication are provided by this little service island which is as slick as a big-city filling station.

They are not as proud of their pilots' lounge which is uncompleted because of shortage of glass. There will be no control tower unless traffic demands it. Excellent visibility and infrequent use of radio by the amateur pilots using the field have not required one thus far. There will be a complete paint and dope plant situated between the hangars. It is partly finished and will have a controlled temperature room.

The whole operation is controlled by Straloch Flyers, Incorporated, owned by a farmer named S. Harold Hopkins. The staff consists of a field manager, who also gives flying lessons; a full-time flying instructor; two airplane and engine mechanics; an office secretary who was once a flying hostess with United Air Lines; and a part time line boy.

About 75 students have been given lessons from the nearby agricultural college—which plays a peculiar role in the success of University Airport—and from the little town of Davis two miles away. When the field was built only about four of the approximately 1,500 residents of Davis had flying licenses. Fourteen months later 40 Davis citizens were licensed pilots.

Land is being broken for a "skymotel" to be built adjacent to the field. But overnight accommodations remain no problem because Straloch Flyers has arrangements with the two hotels in Davis for immediate accommodations to flying farmers. On crowded weekends the overflow can be taken to Sacramento, California's capital, less than 15 miles away.

Straloch Flyers, Inc., now has an agency for Beechcraft planes and for *Ercoupes*, half a dozen of which are owned by the airport for lessons and rental purposes.

Recreational sidelines in connection with the airport include a riding stable, Straloch Silver Spurs Riding Stables. A number of San Francisco Bay Area flyers like to take early morning Sunday hops. A flight from the Peninsula to University Airport and a couple of hours of early morning horseback riding seems to be an attractive way of spending a holiday.

But University Airport never gets very far away from the fact that its main business grows from the farm business. The University of California's College of Agriculture, one of the most advanced in the nation, is only a mile away. California farmers, trading homespun philosophy for textbooks, have been taking increasing advantage of the agricultural school.

The varied crop production which makes up California's leading industry brings farmers to the airport with an amazing variety of problems. From Southern California farmers fly in with questions about citrus trees, olives, truck garden crops, poultry. North of the Tehachapi mountains there is concern about cotton production and cattle. Further up in the great San Joaquin Valley farmers with their own planes and their own airstrips have grapes and dairy cows—and problems. On the peninsula below San Francisco and in central California there are the great orchards, and lettuce in Salinas. Everywhere there is the feeling that production can be increased, quality improved. And everywhere there seems to be plant disease, and the desire to combat it. All of this brings the far-flung farmer to his agricultural Mecca.

In October, 1946, the Flying Farmers of California, Inc., held its first annual convention at University Airport. It was raining and flying conditions were unusually poor but even

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so 25 planes came in for the convention and total attendance was nearly 90. Hopkins was elected president of the association, and Stanley Winters of Davis was selected as vice president. Professor R. F. Miller of the agricultural college was elected secretary-treasurer. Dean Knowles Ryerson, director of Cal Aggies, was among those named as honorary members.

The College of Agriculture does not have any direct connection with University Airport, but it benefits from the field. The school's pomology division, for example, takes advantage of the airport's facilities to take aerial photographs of orchards it has under study. And the airport now is involved in a three-way alfalfa experiment. Dow Chemical Corporation and the college are the other two "partners" in the operation which is trying to find a way to eliminate a weed which kills alfalfa. The chemical concern has developed a process which it thinks will work from the air, sprayed through special nozzles it has produced. The University aided in the research. The airport is donating its planes and flyers in actual experiments over university-owned crops.

Much of the credit for the development and operation of University Airport goes to Hopkins, its angel, designer and owner. Before Hopkins took his first flying lesson he got out his drawing boards and started planning the kind of airfield he would like to be landing on. Less than six months after he got the first desire to get into the air he was piloting his own plane about the state.

Hopkins was a preacher's son who worked his way through California's Occidental College and then spent two years at M.I.T., where he picked up another degree with honors. He returned to California to go to work with the Los Angeles city engineer's office. Then he came north to the Sacramento Valley to set up and manage a reclamation project on the extensive Conway ranch. In about 1920 he bought the 500-odd acres he named Straloch Farms.

Next year Hopkins wants to have the field ready to air express fruit to eastern markets, where it can be sold at a premium. The airstrips now can accommodate DC-3's and will be lengthened if necessary to handle freighting planes.

Another major project is a little dazzling. On Straloch Farms adjacent to University Airport there is a peach and walnut orchard. Hopkins has decided to convert this orchard into rich rural homes with spacious lawns. He already has had Yolo County surveyors project on paper one of his runways through this orchard. Each home will have a sizable garage leading from this runway so that owners of these country homes can taxi in from the airport to their own hangars.

It all adds up to what can happen when a man suddenly decides he wants to fly an airplane—and happens to have a little money lying around loose. END

I Learned About . . .

(Continued from page 52)

nothingness but at grey white-capped water rushing up to meet me. I levelled off as best I could in the gusty wind, and was fearful that this wind would push me down into the angry waters. The throttle was all the way forward now, which may have been a mistake, but I felt that the full power of my small engine would be needed to save me.

Very uncomfortable, so close to the water, I flew straight for a while to let my compass settle down, then turned back toward the east, remembering that the eastern shore of Maryland was flat, whereas the shore line on the west of the Bay was mostly wooded. It wasn't long before the water changed color and on a shelf of ice I saw two swans. Believe it or not, the sight gave me warmth—I was no longer alone.

My troubles, however, were not ended. I flew over islands and bays until I found a more solid bit of land. The fluctuating fog base was below the tree tops, so I couldn't see very far to pick out a field. One appeared, finally, and I started a circle for an approach. But when I was far enough away to come in straight, I couldn't see my landing area! I flew around and found it again, and made my approach without being able to see it until the last minute. The landing was without incident and at the end of the landing run I heaved a tremendous sigh of relief as my wheels sank to the hub caps in a soggy field of winter wheat. I learned about flying—never to be in too much of a hurry to get home—from that. END